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LISTER

AS I KNEW HIM

BY

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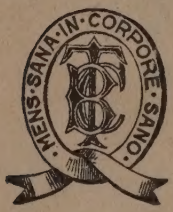

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TO

THE WORLD'S HEALERS

WHO FOR ALL TIME WILL BE REAPING THE

HARVESTS OF HIS LABOURS

"Any anecdotes of Lister will always be welcome from any of the fast disappearing band of pupils who followed him through his wards, and were eye-witnesses of his wonderful work during his earlier struggles."—*Science Progress*, January, 1926.

"It is certain that our descendants will want to know all the details of the man who did so much for humanity, not only for his time but throughout the ages, and it is for those who worked with him to say now all they know about him."—A. H. CHEATLE, *King's College Hospital Gazette*, January, 1926.

PREFACE

More than fifty years have passed since it was my inestimable privilege to work under Professor Lister in Edinburgh.

The charm of his personality, the loftiness of his ideals, and the epoch-making nature of his work left an indelible impression upon those who knew him.

Naturally I have spoken of those days, and the response has often come, "Why don't you write your recollections? They would be of value and interest to those who never knew him;" but the leisure for the work never came.

But of late the thought has forced itself upon me that I am one of the rapidly diminishing few who knew him in his prime, and that an almost sacred obligation lay upon me. The importance of his work will grow with time, but the details of its origin and the fascination of his personality will fade beyond recall.

Twickenham,
April, 1926.

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LISTER AS I KNEW HIM

CHAPTER I

BEFORE LISTER

In October, 1871, I entered as a first-year's student at the newly erected St. Thomas's Hospital by Westminster Bridge, London.

The old hospital which grew up in the Priory of St. Mary Overie was founded in the twelfth century in Southwark, close to London Bridge.

At the suppression of the monasteries Henry VIII. confiscated it, but Edward VI. granted it a new Charter and re-endowment, and it remained on its old site till 1862, when it was purchased by the London, Brighton and South Coast Railway, and London Bridge Station was built upon it.

A great opportunity, therefore, presented itself for building an entirely new hospital upon a fresh site in accordance with all that experience could teach and modern knowledge suggest.

The site chosen was at Lambeth, between Westminster Bridge and Lambeth Palace, extending for half a mile along the then newly constructed Albert Embankment by the side of the Thames and facing the Houses of Parliament, whilst to the west were the open grounds of the Archbishop's Palace. The site was ideal and no

better could be found in the densely populated district of South London.

The Hospital was the first to be built upon the new pavilion system, which allowed free circulation of air around the wards, and the medical school, never a very salutary neighbour, was placed at a distance from the main building.

The wards with few exceptions were above the ground-floor and the blocks were connected by corridors only; a window was placed between each bed. An air-space of 1,800 cubic feet was provided for ordinary cases and 2,500 for infectious ones, and in addition the wards were ventilated with central open-air fire shafts.

The building cost £600,000, a large sum of money for those days; the foundation stone was laid by Queen Victoria in 1868, and she opened it in 1871.

For many years what was then known as "Hospitalism" had occupied the mind of the profession; it was common knowledge that wherever the sick were congregated pyæmia, septicæmia, and erysipelas were endemic, and the consequent mortality was enormous.

Much care and consideration had been given to the subject, and a vast literature had accumulated upon it, and in the absence of any better solution the surgical mind had come to the conclusion that the causes of the evils, whatever they were, had established themselves in the walls of the building, and therefore that new hospitals built of uncontaminated materials were the only effective way of dealing with the troubles.

So with a new hospital built upon a new site, with new furniture and everything new, hope beat high; sunlight and fresh air seemed at last to be given a chance of reaching each patient. Moreover, an entirely new

system of nursing had arisen, and "Mrs. Gamp" and "Betsy Prig" were to have no footing, for Miss Florence Nightingale had selected the new St. Thomas's as the head-quarters of her recently created nurses, who were to be trained in all modern methods and to staff the hospital; and wonderful women they were, ladies often of birth but always of refinement, who were adopting nursing as a vocation rather than a business, and were actuated by the highest ideals for the enlightened care of the sick.

Sir John Simon, one of our senior surgeons, a pioneer and almost a founder of the newly created science of "Public Health," as Medical Officer to the Privy Council, had thundered for years against what he called "Dirt Diseases," and in the building and arrangements of the new St. Thomas's his teachings had not fallen upon deaf ears.

The old dark stuffy wards, hemmed in by lofty warehouses or slum areas, the doubtful drainage, the ancient heritage of disease, the filthy ways and reeky gowns of Gamp and Prig were all no more; a new era had dawned, and surely before such "sweetness and light" the dread enemies that had dogged the surgeons would depart and "Hospitalism" would cease.

But what was the result of all this expenditure of thought and care, and science and money: a new site, a new building, and a new system of nursing? So far as surgery was concerned practically nothing, for the old enemies, pyæmia, septicæmia, and erysipelas, were as rife as ever.

Often in "going round" one came upon an empty ward with a little notice pasted upon the glass door: "Ward closed for cleaning." We knew what that meant,

pyæmia had broken out and there had been a general flitting to another ward in consequence.

We had little idea of the meaning of the matter, for as students we were hardly aware of the existence of "Hospitalism," and merely regarded these outbreaks as a higher tide of ordinary and inevitable conditions.

I remember a sturdy young countryman coming as an out-patient and blushingly telling the assistant surgeon that he was about to be married, and that his sweetheart had alluded to the fact that his nose was too much to one side, could it not be straightened? He had heard of the wonderful things that were done in London hospitals! He was admitted, the septum was straightened, and in five days he was lying upon the post-mortem table, dead of acute sepsis!

The ways of the operating surgeon, as one looks back upon them, seem almost incredible. The silken ligature for tying large vessels was falling out of fashion and torsion was taking its place. I have seen the femoral twisted, and remember the surgeon saying "it was safer so." I suppose he was thinking of secondary hæmorrhage, as the ligature would slough away in its bath of pus. Silver wire was used for heavy suture work, but silk was the usual material. I remember the house-surgeon in the theatre with his bevy of threaded needles dangling from the front flap of his coat, half a dozen of them ready for use, the silken threads sweeping the well-worn cloth which had grown old in the presence of sepsis. But speaking of coats, the high-water mark of old-time horror flares upon me. One of our surgeons lectured upon anatomy in an old frock-coat closely buttoned up to the chin; I see him now, pawing the dissection as he lectured upon it. I suppose there was

a standard of fashion for anatomical lecturers, and the coat had its day and passed into the dissecting-room for his use when he came to give a demonstration, and it hung in the intervals behind the door of his little off-room littered with the lumber of anatomical study. Once more it fell in the social scale, and when past even this work he took it up to the operating theatre. The idea was a good one! Why should he soil the professional frock-coat when a discarded one was available? An operation was a dirty job and an outworn old coat was a suitable garment! I see it now, faded with age, stained with blood and spotted with pus, and remember the quiet smiles and friendly rivalry of some of his colleagues as they "pinched" that coat when —— was not there, a big man's arms protruding through the sleeves as he struggled to bring the unwilling buttons together. Strange though it may seem it was the lineal ancestor of the modern sterilised overall; overalls are not the only things in the drama of evolution that have had a lowly origin, and

> "Men may rise on stepping stones
> Of their dead selves to higher things."

We students were not only allowed to go from the dissecting and post-mortem room to attend midwifery cases, but for ambitious men who were anxious to obtain a certificate of honour it was an approved routine. True there was a faded notice-board in the dissecting-room on which was written: "Gentlemen who are dissecting or doing post-mortem work should wash their hands in chlorinated soda solution before going to their cases." But I never knew of any one doing it, nor was there any intimation as to where or how it was to be obtained;

neither had we the least idea of the meaning and reason of the notice.

Ovariotomy was coming along, and one of our surgeons was keen on it; his mortality was round about 80 per cent. I used to dread seeing a notice of the operation, as I knew that in a few days the patient would probably be lying on the post-mortem table. I remember thinking the operation ought to be abandoned; but failure was attributed to the fact that the proper way of dealing with the stump had not been perfected.

Every dresser carried a leathern pocket-case prettily lined with velvet plush, which was soon begrimed with blood and pus; but no one had any idea that such was dangerous.

A rival to ——'s coat was the "ward sponge": it appeared at all dressings, it was simply wrung out in warm water and passed from case to case. It was the fashion then "to clean up ulcers," and nothing did the work so well as the sponge.

An old sister who had spent her life in the service of the Hospital, once sadly said to me: "I really do not think the physicians do much good, and as for the surgeons, I think they do as much harm as they do good."

Puerperal fever was endemic and often ran riot. A general practitioner I knew well, who had a small but select practice, lost ten women in a few months, and half-distracted, fled the district. A well-known London lying-in hospital would close its doors when the mortality reached 25 per cent. It was no uncommon thing for a mother to die within a couple of weeks of child-birth leaving a young family behind her, or to learn that a friend had never known a mother's care as

she had died shortly after he was born. A certain amount of fever after parturition was regarded as normal, due either to "the coming in of the milk," the too early visitation of friends, or to some rash exposure causing "a chill." My mother told me that an hour after I was born she inadvertently put her hands over the top of the bed-clothes and was so severely scolded by "Mrs. Gamp" that she cried!

An old and experienced practitioner told me quite seriously that puerperal fever prevailed whenever a lioness pupped at the Zoo!

But in justice I ought to say there was a vague rule that it was not wise to attend a confinement if one had recently been to a case of scarlet fever, and this comprised our knowledge of the subject. But no teacher, either in London, Edinburgh, or Vienna, ever taught us to wash our hands before examining a case.

Kind reader, forbear reproof! We were doing our best, we were as anxious as you are to heal the sick, our hearts were charged as fully with tenderness, and life was certainly esteemed more sacred, as death was regarded as the portal to irrevocable destiny and therefore loomed more terrible. Perhaps the medical profession was actuated by even higher ideals and certainly was less tinctured with commercialism than it is to-day. Many of our teachers urged upon us the necessity of practising our profession from the highest motives, a thing hardly mentioned to-day. It was not "Pecksniffism"; they spoke from conviction, and impressed upon us that only by impersonal considerations and high ethical ideals could medicine adequately sustain the burden of responsibility that lay upon it.

It is only when one contrasts the present with the

past that one realises the change: a modern surgical ward and the memory of an old one; the awful mortality of the old operations and the ceaseless flow of successful modern ones; the old long-drawn-out feverish weakness and the present short, easy, and uneventful convalescence.

No one who has not lived through the two periods can realise the change; no one who has not watched through the night can appreciate the day.

Do not think that St. Thomas's was an awful exception and that things were better elsewhere. We were without question the most up-to-date hospital of the day: Le Gros Clerk, our senior surgeon, was President of the College of Surgeons; John Simon was Medical Officer to the Privy Council and the founder of Public Health; Risden Bennett had been President of the College of Physicians; Murchison was known the world over for his treatise on fevers; Ord discovered myxœdema; Lebrich, our ophthalmic surgeon, enjoyed a European reputation; Robert Barnes was the leading authority on obstetrics; and George Rainey had done more to advance anatomy than any of his generation. Over half a million had been spent in erecting a new hospital upon the most modern principles which occupied a unique site, and nursing had been transformed and brought to a height never before attained. I only enumerate these points to emphasise the fact that science had failed! that we were blundering in darkness knowing nothing of the causes of the troubles; were straining at gnats and swallowing camels; and, saddest of all, whilst striving to heal were only too often the ministers of death.

Much had been written about "Hospitalism," and no one could shut their eyes to its woeful existence.

Holmes's big *System of Surgery*, the classical work of the day, devoted almost the whole of its first volume to infection, contagion, pyæmia, etc., and a sagacious few, Burdon Sanderson amongst them, were beginning to believe its causes were *particulate*. That was a great advance, as it withdrew the subject from the vague generalities of temperament and miasma into the regions of practical helpfulness. But that which is common evokes little surprise, and these evils had come to be regarded much in the same way as a London fog—unwelcome, unconquerable, and inevitable!

Of course we had our remedies. Alcohol and quinine were the sheet anchors. The alcohol mania was then at its height; the amount spent upon it by hospitals was enormous, and it was regarded as essential in the treatment of disease; quinine was pushed to its full extent, and one protoplasmic poison was thus added to another. The kinds of dressings were keenly debated; generally lint was wrung out in warm water or lead lotion; but for a period all dressings were abandoned and the "open system" adopted, the wounds being freely exposed to the air and covered only by a cradle. But two of our surgeons moved in the right direction: Le Gros Clerk soaked the lint in spirits of wine and John Simon had his operation instruments immersed in boiling water, and I remember how old Millikin, the instrument man, jibbed at the procedure, and with what suppressed indignation he flipped his fingers as he picked them out of the hot water. But Simon was on the right track, he was after the "particulate" and vaguely chasing his "dirt diseases."

A great deal was said about "temperaments": if high fever followed an operation it was due to a

"sanguineous temperament"; if luckily the patient escaped a gross infection, the beneficent possession of a "phlegmatic temperament" was assumed. Pus was everywhere, and what was known as "laudable pus" was hailed with approval, and its absence correspondingly deplored. It was vaguely supposed to be contagious and to be formed from the white corpuscles, and these two facts comprised our knowledge. It was many years later that Ogston of Aberdeen discovered the organism, and I remember the excitement it caused.

What can one say as one recalls these scenes of the 'seventies? We were zealous, we flew at each symptom, temperatures were reduced, diarrhœas were checked, sweatings were curtailed, and rigors were drowned in brandy and smothered in blankets; we did not fail in effort and were perpetually mopping up the mess; we classified the troubles, named them in mongrel Greek and Latin, and felt a sort of smug satisfaction at our erudition! One comment only can be made: "It was before Lister."

And yet that is not quite the truth: it was before Lister's work was understood, and the microbe recognised as the cause of the troubles. The struggle between Biogenesis and Abiogenesis was proceeding, and very few believed that life arose from life only; by far the greater number thought it arose *de novo*, and so were haunted with the paralysing misgiving that even if some microbes were shown to be the cause of the evils, they might after all develop spontaneously and thus defy all efforts at prevention.

But sad to say, the antiseptic treatment had actually been tried by two at least of our surgeons and had proved a failure.

It was at St. Thomas's that I first smelt carbolic acid and became familiar with the old sticky yellow gauze, and yet the demonstration of its failure seemed complete. Had not carbolic acid been sprinkled upon the wound and carbolic gauze applied as a dressing? and yet a few days later the patient's temperature was high and he had had a rigor! He was evidently no better than if he had been treated by the old methods!

The history of many a vaunted remedy was recalled which experience had shown to be useless, and so antiseptics took their place with other broken bubbles that had risen in splendour and faded into oblivion.

Fatal are the dangers of half-truths and rule-of-thumb practice divorced from knowledge; but think of the limitations of those days. Bacteriology did not exist, the microscope was inadequate, oil-immersion lenses were non-existent, aniline dyes were not discovered. The new knowledge was all so vague and problematical that even Pasteur and Lister had hardly adequate ideas of the evasiveness of the foes; small wonder then that the meaning of surgical cleanliness was completely misunderstood, and that to fail at one point was to fail at all. The technique was so strange, the pitfalls so numerous and the precautions so meticulous that it was impossible for any who had not studied under Lister to succeed.

Three other of the largest London hospitals had to my knowledge tried their hands at antiseptics and also failed, and so the dawn of the new era clouded and passed, and the demon of sepsis kept his stranglehold upon the metropolis.

CHAPTER II

HOW I CAME TO WORK UNDER LISTER

In the 'seventies the medical curriculum at the hospital occupied only two and a half years. The first year and a half of the student's life was generally spent in apprenticeship to a general practitioner, and this was an excellent way of learning the workings of a practice, the art of prescribing, the mysteries of medical book-keeping, and the thousand and one little things that go to make a successful practitioner.

Apprenticeship was, however, falling out of favour; had not Bob Sawyer and Ben Allan been apprentices? and surely one could improve upon them! And so a fair proportion of students began to shun the country surgery, with its pestle and mortar and club practice, and choose the more attractive way of at once entering the hospital.

This was the course I adopted, and at the end of the lectures found myself with a year and a half before me which was to be devoted to clinical work, and this is the clue to my story.

With the coming of the old St. Thomas's Hospital from its temporary lodgment at the Surrey Gardens to its new and enlarged home on the Embankment an increase of the staff was necessary, and amongst others Dr. Charles Murchison, F.R.S., of the Middlesex Hos-

pital, joined us. He had written a classical work on fevers, and also on the liver, and had won a great reputation as a clinical teacher; he had learnt the method from Professor Hughes Bennett in Edinburgh, "Diagnosis by Exclusion." "It is not this, it is not that, then it must be so-and-so." One of his colleagues humorously said: "The whole scheme of medicine has been revealed to him from heaven!" His lectures were oracles, models of arrangement, everything was methodised, classified, and tabulated; they primed us for examination, fascinated our ignorance, and compelled our acceptance. We learnt later that disease was not so definite, but as students we never questioned, and accepted the pronouncements as final and complete.

Twice a week he would go round the wards followed by a crowd of students and a sprinkling of strangers. When he came to a new case he would take out his note-book, look at the list of the men who wished to be called up to examine the cases, and select them in rotation. It was a serious ordeal; gravely and patiently we were taken over the ground, our steps guided and our errors corrected; the history of the case, its symptoms, physical signs, diagnosis, and treatment were all gone over. It was a unique training for those days, and though the examinee had some bad moments the system was admirable. Murchison had rather a tender corner in his heart for those who displayed sufficient earnestness to run the gauntlet, and he did not forget them. I had been upon his list for months, and one day when he had finished his round I went up to him as he was walking away down the corridor, and asked his advice about my future. This year and a half I had before me, what was the best way to spend it?

Was there any suggestion he could make as to the best path to follow? I have often wondered at my temerity, as he was by no means easy of approach, and the question after all was unusual, as the natural thing would be to follow the ordinary routine of the hospital; but I was anxious to know if he had any special suggestions to offer. Gravely he trained his wonderfully expressive eyes upon me, and slowly and emphatically said: "If I were you, Mr. Leeson, I should not spend the whole of my time at St. Thomas's, I should go to Edinburgh and follow the practice of Professor Lister; I believe there is a great future before his work and that it is well worth your while to study it." This was quite other than I had expected. I was, of course, familiar with the fame of Edinburgh as a medical school, for were not Dr. Peacock, our senior physician, and Dr. Murchison himself both Edinburgh men? Had not Sir James Simpson given us chloroform and Dr. Gregory his immortal powder? But the advice was definite and the habit of accepting all that Murchison said had become so much a part of my nature that to question or disregard his counsel seemed impossible; so after consulting with my parents I called on him and told him I was following his suggestion. He wrote me a letter of introduction to Professor Lister and Dr. Grainger Stewart, and the next summer found me in Edinburgh.

I remember the journey: there were no cushions to third-class carriages in those days and sleep was difficult. We tore through the Black Country with its belching furnaces of flame and terror; perhaps, after all, the early teachings of my childhood as to the ultimate consequences of wrong-doing were more than allegories! The beauties of the dawn as we sped through mountains

and over bouldered streams, the early arrival in the slumbering city, grey and dim, with its great piles of many-storied houses and the mighty mass of the Castle Rock towering above; how well I remember them, and the sense of loneliness and adventure, and the wonder as to how it would all turn out!

CHAPTER III

MY FIRST IMPRESSIONS

How I settled down and got into touch with realities I hardly remember, but it was not long before I found my way to Lister's wards.

He had about half of the old surgical hospital for his beds. It was a grim, formal stone building of bastard classical design, originally built for the old high school, and is now allocated to the engineering department of the university. It was hemmed in by lofty buildings to the south, which nearly deprived it of direct sunlight, and was situated in a hollow which sadly limited air movement. The road to it led down a steep side street from the South Bridge.

It wore an aspect of uncongenial severity and struck me as a place in which it would be difficult to get well; everything was of dingy stone, the passages were badly lighted, chiefly from the open doors of the wards. A strange smell pervaded the building of distant carbolic acid, stale tobacco smoke, and ancient boiled beef!

I wandered through the lower floor seeking the professor; everything impressed me unfavourably, the gloom, the crowded wards, and a bed in most of the corners.

I could hardly believe I was in a hospital after my experiences of St. Thomas's. Everything seemed to lack precision: there was a kind of "do as you can"

PROF. LISTER'S WARDS IN THE ROYAL INFIRMARY, EDINBURGH

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atmosphere without any attempt at organised trimness and efficiency.

But what struck me most was that the patients seemed happy and comfortable, and were evidently doing very well, as the majority were sitting up in bed talking or reading; there was sunshine within if there was little without.

I glanced at the temperature charts at the head of the beds, and to my surprise the line of dots ran strangely along the normal; a few had commenced with the old familiar zig-zags but quickly seemed to fall into normal ways, and as I did not see any "Nightingales" about I thought, perhaps, they might not be reliable.

A crowd of students and several middle-aged foreigners told me I had found my objective, and there was Professor Lister! Though fifty years have passed the memory of the scene is clear and vivid as though I had just left him.

W. E. Henley was a patient in his wards for twenty months, and wrote some charming verses entitled "Hospital Outlines, Sketches and Portraits," which were published in the *Cornhill Magazine* of July, 1875; and here is "The Visit."

"A rush of feet reverberates without
Through the long, flagged, deep-vaulted corridor:
Then enters the Professor with a rout
Of students at his heels . . . eighty or more.
Dull men in spectacles, of doubtful stuff,
Some keen and resolute and heavy-browed,
Some vacuous and common-place enough,
But the Professor? Oh, the kind, calm eye,
The mobile mouth, the forehead broad and high,
The artist hand . . . he looks: you hold your breath,
Waiting his word. A modern Hercules,
Wrestling with Custom, Prejudice, Disease,
As his great prototype with Hell and Death."

There he was, the centre of attraction around which everything was moving, but he himself seemed lost in his work; a strange solemnity pervaded the scene; he was dressing a case and there appeared to be an extraordinary complexity in the process, the clerks and dressers were working in clocklike unison, and seemed to anticipate his every movement.

The case was just finished, and Lister moved to the next bed, greeting the patient with an indescribably sweet and winning smile which quickly faded into an expression of serious thought.

The limb was uncovered, the bandages quickly cut with " pommettee "-pointed scissors, which later I learnt were to avoid pricking the patient, and then he turned to the clerk who carried a large metal steam spray, and with a careworn expression of countenance said, " Spray, please," and a dense cloud of vapour at once enveloped the limb.

The professor and his assistants were perpetually dipping their hands in large tin basins of carbolic lotion, and the sleeves of their coats were wet with the spray. The dressing removed, it was carefully smelt and all round the edges to ascertain whether it was sweet, and then with a smile of pleasure the foreigners were invited in a few words of French or German to confirm the fact; everything seemed to turn upon whether it was free from putrefactive odour; the wound was bathed with boracic lotion, a strip of oiled silk laid over it and the fresh dressing of many layers of carbolic gauze, backed with a thin mackintosh, was secured with gauze bandages. There was no attempt at orthodox bandaging, the bandage ran as it would and when too erratic was arrested with a safety-pin. An assortment of small

pillows and sandbags were adjusted to relieve all sense of strain, and when he was satisfied that the patient felt quite easy he replaced the bed-clothes, putting them all trim and square, and smilingly asked: "Now are you quite comfortable?" and passed on to the next case.

I had never witnessed such personal care bestowed upon a case, nor ever remember a surgeon who seemed to be working under such a sense of anxious responsibility over a dressing.

He spoke little, and that chiefly in short sentences to the foreigners, and from what I could gather it referred to the antiseptic aspect of the case. Of clinical teaching there was little; no medicine was ordered, a strange thing in those days, and every one seemed to be on the same diet. No nurses were present, and I remember wondering how things could possibly go on without them. The visit occupied an hour and a half, the crowd melted away, and I stopped behind to examine the curious spray upon which so much appeared to depend, and then retraced my steps through the dim and gloomy passages to the cheerless and smoky outside.

I seemed to have been in a dream where everything was topsy-turvy and all that I had been taught to consider essential seemed non-essential; the costly buildings, the spacious wards, the indispensable "Nightingales" and the bottles of medicines, so far as the well-being of the patients was concerned, appeared superfluous.

There were no "sanguineous temperaments," little pus and no pyæmia, no swinging temperatures or putrid wounds, yet the wards were stuffy and sunless and the patients were without medicine, and seemed to be living hum-drum and uneventful lives; their wounds had healed by first intention and some of the dressings

were being left unchanged; many of them appeared to be in bed as the easiest method of getting them out of the way and as the best plan for whiling away their hospital hours.

Understanding nothing of the matter I attributed it to the hardiness of the Scottish constitution, and thought how fortunate surgeons were to have such sturdy material to work upon.

But the figure of Lister dominated all, his dignity and purpose, his tenderness and gentleness, his sympathy and service; and yet I could hardly think the unemotional Murchison was thinking of these when he advised me "to go and see the practice of Mr. Lister."

Fifty years have passed but the vision of him has never faded; his unique personality, his unquestioned capacity, his absorbing concern to mitigate suffering, his tenderness and his pity came to me as a revelation, and it grew with time.

I had never seen his equal.

Transcendent as were his epoch-making discoveries, the man was more than the message.

CHAPTER IV

MY VISIT TO CHARLOTTE SQUARE

I ATTENDED Professor Lister's wards daily and gradually became familiar with the technique of his antiseptic treatment; but it soon became evident that if I wished to acquire any proficiency in the art I must go through the regular training as one of his dressers, as nothing short of a systematic drilling in the novel and complicated methods would be likely to be of any real value.

The method of procedure was to call upon him at his house and ask to have one's name placed upon his list and wait for a vacancy. But I did not relish the task; I felt nervous at approaching him, and that strange atmosphere of inaccessibility that always—I am sure quite unintentionally—enveloped him, awed me; however, if I wished for the privilege I must face the ordeal. I comforted myself, moreover, with the fact that I had a letter of introduction from Dr. Murchison—an advantage I could not forgo—and was thus better off than most of my fellows, so I screwed my courage to the sticking point and determined the venture.

The professor lived at the west end of the town in Charlotte Square, the Harley Street of Edinburgh. It was a large and solemn-looking square of formal stone houses. This north side of the town is of comparatively recent origin; its wide and regular streets were planned

early in the nineteenth century, and many of its houses, those of Charlotte Square amongst them, were designed by the celebrated Robert Adam in his characteristic classical style. On the west side of the square towered the fashionable and imposing church of Free St. George's, which diffused a solemn and serious atmosphere upon the scene.

The professor's house was No. 8 on the north side. It is strange how nonsensities strike us, but as I stood upon the very broad steps gazing into the unusually large kitchen area it seemed like a moat which made Lister still more inaccessible. The area was walled and paved with the prevailing stone of the city, which seemed so well in keeping with the serious lives of the inhabitants; there is something repressing about a stone city, its formal rigidity seems to cramp the lighter side of one's nature and force one in upon oneself.

The door was opened by the butler. I know not what there was about these men but the butler of the Victorian Age was a creature to be reckoned with. Thackeray called him "Mr. Bludgeon." In their presence I have always felt a strange sense of unworthiness; they seemed to resent intrusion and conveyed the impression of reception on sufferance; nowadays they have been replaced by pleasant women, sometimes dressed as nurses, and this must be a comfort to nervous patients and diffident students. The butler eyed my card coldly, took my letter of introduction from the great Murchison with equal indifference, and showed me into the dining-room, and in a few minutes I was summoned into the presence of Professor Lister.

It was a spacious oblong room lighted by large north windows and lined with stately glass-fronted mahogany

book-cases; at a writing-table sat the professor, who rose to meet me, greeting me with that sweetly attractive smile with which those who knew him were so familiar, gave me a kindly welcome, asked after Murchison, said he was pleased I had come to Edinburgh and that he would gladly render me any assistance that lay in his power.

I felt instinctively that I was in the presence of a very unusual personality: such a combination of refinement, ability, benevolence, and sweetness of disposition as I had never before met; he seemed the embodiment of high purpose; an emanation of goodness radiated from him.

I told him that the object of my visit was to bring Murchison's introduction and to ask if I might become one of his dressers. Reaching a little book from one of the drawers in his writing-table he entered my name, said I should begin next winter, and that meanwhile it would be well to familiarise myself with the work by attendance in his wards.

He then led me to the windows before which on a long table were several rows of test-tubes covered with glass shades, half full of various liquids, and in the mouth of each was a plug of cotton wool.

It was a curious assemblage such as I had never seen, nor could I form the least conjecture as to what they were or why they should be plugged with cotton wool; my experience of test-tubes was an open mouth and I never remember having seen them closed.

With the greatest care and pride he picked out one here and there, held it up to the light and seemed inexplicably pleased at its condition: this was clear, this was turbid, and this was mouldy. Of course I

tried to show an intelligent interest but had not the faintest idea as to what it was all about, and wondered what connection they could have with my visit or with any branch of surgery; and I remember thinking it strange that so eminent a surgeon should be interested in such an unusual subject and could find time to study such irrelevant and out-of-the-way matters.

A large Powell and Lealand microscope stood upon a table, which I recognised as similar to one that old Rainey, our revered octogenarian demonstrator of anatomy at St. Thomas's, so often pored over in his little room; it seemed to bring the professor back to reality and to bespeak a spirit of unusual scientific inquiry, but I had not the least idea that it had any connection with the plugged test-tubes. Such a state of ignorance in these days of bacteriological enlightenment may seem incredible, but I record the fact that though I had spent two and a half years at one of London's largest and most up-to-date hospitals, and had "taken out" all the lectures, I had never heard anything about microbes and am not sure that I even knew of their existence, and certainly had not the slightest idea that they had connection with medicine or surgery.

A kindly shake of the hand, another delightful and charming smile, and I found myself in the Square; its aspect seemed to have changed, it had lost much of its austerity, and I felt wildly glad that I had got through the visit and was now definitely on the road "to dress for Lister."

CHAPTER V

LISTER'S EARLY LIFE AND WORK

"The childhood shows the man
As morning shows the day."

MILTON.

His father's family were Yorkshire folk, and it was to this that he probably owed his excellent physique, determination, and endurance; furthermore, they were Quakers, and that connotes much that will concern us. Serious, high-minded people, unaffected by the fashions or follies of the day, and not infrequently devoting their leisure to scientific pursuits, it is surprising how many members of the Society of Friends have risen to scientific eminence.

His father, Joseph Jackson Lister, was a prosperous wine-merchant in the City of London and also an eminent scientist, and his name will always be associated with his discoveries in optics, which led to the perfecting of achromatic lenses, and the great improvement of the compound microscope. He was a Fellow of the Royal Society, and his bust still adorns the rooms of the Royal Microscopical Society. He lived in a fine old house at Upton in Essex, which is still standing, where Joseph Lister, his fourth child and second son, was born on April 5, 1827.

The tenets of Quakerism naturally influenced his education, no "Friend" would have considered the public schools of those days a fitting place for his son, and the

old English universities were barred by religious tests which excluded all but members of the Church of England; but notwithstanding these limitations, Lister received a sound classical education and did not hesitate at times to indulge his class with short quotations from Virgil and Horace, accompanied always by a quaint smile and coy glance to see if they were duly appreciated.

He inherited his father's love of science, and boylike turned to what would now be called Nature Study or the observation of plants and animals, and all through his life he was interested in botany.

Love of science, devotion to duty, self-restraint, and powers of work, all these and more he learnt in his home life and never let them go.

When, therefore, he chose medicine as his life's work his path almost inevitably led to the newly founded University of London and its teaching centre, University College in Gower Street, the headquarters of the Non-conformist intellectuality of the day and the focus of a brilliant coterie of medical and scientific celebrities. He entered at the age of seventeen in 1844 and remained at the hospital till 1853.

It speaks much for his thoroughness and high ideals that he so early recognised the importance of a liberal education as the proper preparation for the study of medicine, and that he devoted the first three years of his academic life to an arts course and obtained his B.A. at London University before commencing his medical studies. One cannot but think it was his sympathy with suffering and his desire to alleviate its woes that inclined him to medicine, and that it must have meant a certain amount of self-denial to devote three preliminary years to Arts in order that he might lay a sound

foundation of general culture upon which to build the superstructure of medical knowledge; but this was characteristic of his life; he felt and taught that disease is so complicated and involved a subject that a trained and furnished mind should be brought to bear against it.

Had he been content with the ordinary information of the day he would never have wandered a few years later into those recondite fields of infinitely minute life which Pasteur was exploring. I know not whether, like Bacon, he aspired to making all knowledge his province, which was at any rate in the then limited fields of science vaguely possible; but it was the thirst for inquiry that was the mainspring of his life.

How far the tenets of the Quakers retained their hold upon him one cannot say, but the spirit of the Friends never left him; his quiet and deliberate speech, his modesty and freedom from personal assertion, his generous and forgiving spirit, were marked features of his character, and certainly the latter quality was severely tested in the early days of antiseptics, when he suffered from misrepresentation not infrequently tinged with sarcasm and verging even upon contempt. Yet we never heard an unkind word escape his lips. Sadly and pathetically he would shake his head, sigh, and say, "Well, gentlemen, it is no new thing for me to be misunderstood," but retaliation or invective were to him unthinkable.

Those who have come in contact with "Friends" will admit that these traits are amongst their most distinguishing qualities, and Lister not only inherited them to the full but doubtless developed them from his early surroundings. In the corrupted currents of the world they do not always make for success; the lives of many

who have risen to eminence have often been soiled with unbecoming assertion and disregard for the feelings of others, but here and there the meek do "inherit the earth."

Lister never spoke of his arts course though I think he was rather proud of it; he certainly was one of the best educated surgeons of his day, and was, I think, conscious of it. He had a way of referring in sad tones to any educational defect that came to his notice. One day a letter was handed to him in his little room adjoining the wards, in which "professor" was spelt with two "f's"; with a plaintive little sigh he said: "Ah! gentlemen, the result of defective education!"

He was at times, perhaps, just a bit of a pedant, but in those days the educational standard for surgeons was not of a high order, and it was rare for them to have devoted time to the arts; they were usually in a hurry to get qualified.

Of his medical teachers at University College he never tired of speaking: the name of Professor Sharpey, probably the most eminent physiologist of the day, was frequently upon his lips, and for him he had a profound reverence; Dr. Wharton Jones, another noted physiologist, had also a great influence upon him; and Mr. Robert Liston, one of the surgeons, was sometimes mentioned. Many of his teachers were leaders in science: Lindley, the renowned botanist; Thomas Graham, the illustrious chemist of crystalloid and colloid fame; and George Viner Ellis, the accomplished anatomist; and it was to such that he owed his ample knowledge of the sciences upon which medicine is founded, and these were just the kinds of men to equip him for a life of inquiry and a career of research.

The effect of their teaching was to imbue him with a philosophic attitude towards disease, and it was this that appealed to him so strongly, facts crystallising into principles from which practice could be deduced, and the master-key was physiology, a science that was only slowly receiving the attention it deserved and which was regarded in the medical schools as of secondary importance to its elder brother anatomy. Surgeons with but few exceptions, of whom John Hunter was an outstanding example, devoted scant attention to even the little that was known of it; it was tacitly consigned to the physicians. The surgeon was a man of action troubling little about the "why"; the physician was a man of theories compelling attention to the "how."

I remember my amazement in looking through the Edinburgh University Calendar that I could not find any mention of "Physiology," and wondering how any medical school could ignore the subject; but later I discovered that it appeared under the title of "The Institutes of Medicine." Now medicine comes from "medicus," and medicus means a physician, and the inference the student drew was that it referred to the mysteries that led up to pills and potions, and had little to do with splints and instruments.

But Lister thought otherwise, and realised as few before him had that the institutes of medicine were the institutes of surgery also, and that:

> "To search through all he felt or saw
> And reach the law within the law,"

was the only right and proper way to practise surgery, and in this Sharpey was his early guide.

To fathom Nature's mysterious ways when harried

by disease and grasp what she is aiming at, to understand her purpose and run with her in double harness, this he realised was the road to success. He saw dimly what we are now seeing clearly, that Nature is the oldest practitioner. Probably he understood but little of the great truth that is now common knowledge, that every organism is a living witness to the age-long acquirement of its defensive mechanisms, but he glimpsed the truth and followed the gleam.

It was these intuitions that early led him to undertake his classical researches upon the coagulation of the blood. Why did it clot as soon as it escaped from its normal surroundings, and what did this fact mean? If Newton was the first to see an apple fall, Lister was one of the first to see the blood clot! "Could we observingly distil it out?" There was a world of suggestion!

Later he studied the early stages of inflammation, which process had hitherto been considered a disease. To him it began to reveal itself as a response to disturbance, a mobilisation of forces to meet a foe; later, by the work of Pasteur, he unmasked the disturber; but all along, his research into this matter was a physiological one.

With prophetic vision he saw that if ever the surgeon would be able to say:

> "The charm dissolves apace;
> And as the morning steals upon the night,
> Melting the darkness . . ."

so it would only be through the magical wand of the researching physiologist that the obscurities of disease would merge into the light of knowledge.

To-day all this seems a platitude. This age may rightly be called the Era of Research, but it was very different in

the 'fifties, and it is impossible for any but the old to realise how far and how fast we have travelled. Medicine sprang from magic and was reared on empiricism, and it is only in the last decades that it has been adequately nourished by science, and the world can never pay its debt to the pioneers who hewed the way through the jungles of ignorance and superstition.

In 1851 Lister became house surgeon at University College Hospital to Professor Erichson, one of the leading surgeons of the day and widely known as the author of the standard text-book on surgery which held the field for many years, and this appointment orientated his life, for an epidemic of hospital gangrene broke out in the wards and so distressed him by its ravages that it kindled that fire to unravel these mysteries which burnt henceforth upon the altar of his heart. But I shall speak of this later and tell the story as I heard it from his lips; suffice it here to say it was the source and inspiration of his epoch-making work. Anæsthetics had been recently introduced, and now that surgery was endowed with so priceless a gift, hope beat high that its triumphs might be almost indefinitely extended and the range of operative work illimitably increased.

Surgeons were then excellent anatomists, and were possessed of a rapidity and dexterity that the absence of unconsciousness imperatively demanded; yet in spite of their brilliant successes, a few days after the operation the patient was only too often swimming for his life in a raging sea of fever and foundering in the storm. The sequence was so common that it was regarded as ordinary, for all suffered in a greater or less degree; temperatures rose and pus flowed as a matter of course, and it was only when the mortality reached unusual heights that

consternation was expressed and inquiry suggested. Throughout the ages surgeons had accepted the sequence, but now and then questionings would arise. It had already been observed that operations performed in the country were less fatal than those performed in the town, and that those performed in private houses did better than those done in hospitals, and this was attributed to the purer air or better constitution of the patient; but this failed to satisfy the inquiring mind and pitying heart of Lister, and the matter weighed upon his soul as a problem which above all others pressed for solution.

One thinks of Christian in the *Pilgrim's Progress*, and I cannot refrain from quoting the passage: "I saw a man standing in a certain place with his face from his house, a book in his hand, and a great burden upon his back. I looked and saw him open the book and read therein, and as he read he wept and trembled, and not being able longer to contain, he brake out with a lamentable cry, saying: 'What shall I do?'" We all know the sequel, the difficulties and discouragement of the way, the indifference and jibes of his contemporaries, the long struggle and the ultimate success, and how it was vouchsafed to Lister as it was to Christian to see his burden roll away and to enter the City of Safety.

His earliest publications were upon the muscles of the iris and the involuntary muscles of the skin, and it was natural these should be microscopical subjects considering his father's interest in and work upon the microscope which must have been constantly before him.

At the end of his nine years at University College he found himself without any definite plans as to his future, and Professor Sharpey, himself an old Edinburgh man,

advised him before settling down to visit its famous medical school, and especially to follow the practice of Professor James Syme, then in the height of his fame as one of the leading surgeons of Europe.

Lister took his advice, intending at first to make but a short stay; but he became so fascinated with Syme and engrossed in his methods that he remained for several months. As luck would have it, Syme's house surgency unexpectedly became vacant, and he offered Lister the post.

A lifelong friendship sprang up between them, and later he became his private assistant and subsequently married Agnes, his eldest daughter. The union was a happy one; they were devoted to each other, and she threw herself heartily into his work and rendered him constant clerical assistance. To their grief they had no children. The history of childless genius is a sad one. Nature often appears to spurn her masterpieces, and having created a great soul, seems affrighted lest she has gone too fast, and relapses again into mediocrity.

Lister never tired of speaking of "Mr. Syme," whose influence upon him was boundless and remained to the last a commanding influence in his daily work; his improvements in operations, the instruments he had devised, his maxims and aphorisms were constantly upon his lips. Often he would pause, look round and say with delight: "Ah! gentlemen, one of the many things I learnt from Mr. Syme."

The attractions of Edinburgh proved supreme, and Lister settled down and became an "extra-mural lecturer" in surgery. The system of extra-mural lecturers was unlike anything in London; promising young men obtained permission from the university

to have their lectures recognised for graduation purposes; they hired a little lecture theatre and got what pupils they could. The system has been of much value to the School, in the small classes the men received individual attention, and the extra-mural teachers exercised a stimulating influence upon the professors, as students are good judges as to where they get the best value for their fees. Matthews Duncan was an extra-mural teacher in my day and his class was crowded, whilst the Professor of Midwifery lectured to but poorly filled benches.

Lister's initial success was only moderate, but it grew slowly and surely, and he was appointed an assistant surgeon to the Royal Infirmary, a fact that spoke much for his worth, as Scotchmen in those days were clannish in their preferment! He now began his classical researches on the coagulation of the blood, the early stages of inflammation, and one on that strange subject, the distribution of pigment in the frog, and these doubtless paved the way for his election to the Royal Society in 1860 at the early age of thirty-three.

For four years he continued his work, which so far as private practice was concerned centred chiefly around the influence and help of Syme. In 1860, after a long and trying candidature, to his great joy he was appointed Regius Professor of Surgery in the University of Glasgow at the age of thirty-two and held the appointment for the next nine years, but twice he tried to escape. In 1864 the Chair of Surgery at Edinburgh fell vacant and Lister naturally became a candidate. It is hard to realise that he was defeated by James Spence, and those who knew the two men may well be amazed. I say nothing against "Jimmy," as we used to call him; he was a good

anatomist and an ordinary man; but to think of him defeating Lister! It could only have happened by "breaking down the pales and forts of reason," and the scales of justice must have been weighted; the appointment was in the hands of curators who, alas! were at times influenced by extraneous motives. Matthews Duncan, the greatest gynæcologist of his day, failed to obtain the Chair of Midwifery owing, probably, to the fact that he did not belong to the influential religious section of the day!

Two years later Lister had another fall: he contested the vacancy for the Chair of Surgery at his old hospital, University College, London, and was defeated by John Marshall, who had never left the staff. But Marshall was a man of science and ought to have succeeded against almost any one—except Lister.

Poor Lister! When one thinks of all he was and yet how slowly he won success one feels more reconciled to the "slings and arrows of outrageous fortune," and that the consciousness of duty done and service rendered is the only recompense on which the worthy can rely.

Three years later Fortune smiled upon him. In 1869 Syme was laid low by illness and resigned his chair, the patronage of which was fortunately in the hands of the Crown, and Lister was appointed his successor.

As Professor of Clinical Surgery in the University of Edinburgh he now occupied a unique position, the class was the largest in the kingdom, probably in the world, numbering in my day some three hundred and fifty students, who were drawn from all parts of the Empire, and no more fitting centre for the dissemination of antiseptic surgery could have been found, in addition to which the emoluments were considerable. So at

the age of forty-two Lister found himself in clover, in the city that he loved, surrounded by a crowd of eager listeners, and with every opportunity to develop his discoveries, the truth and value of which were daily becoming more and more evident.

CHAPTER VI

THE HISTORY OF ANTISEPTICS

The word "antiseptic" is nowadays so common that it is difficult to realise it only came to birth some sixty years ago.

Antiseptics had, as I have said, been tried in London and abandoned; we students were familiar with the word but had no intelligent sense of its meaning. The word "septic" I heard for the first time in Edinburgh from Lister's lips. I am sure of this because I remember making a note of it at the time and finding in the University Library that it came from "σηπτικός," "putrid." It was generally believed that Lister had coined the word, we did not know that he had unearthed it from medical obscurity, and it enhanced my respect for him that he could produce a needed Greek root from the chambers of his mind; few of his contemporaries could have done it.

With the word "pyæmia" I was only too familiar, and it seemed strange to me that there were no cases of it in his wards. I remember thinking it must be due to some peculiar sturdiness of the Scottish constitution, and I was so engrossed with the fascinating personality of Lister that I did not go into any of the other surgical wards. Had I done so I should have renewed my acquaintance with the old enemy, as none of Lister's

senior colleagues accepted antiseptics, and my faith in the vigour of the Scottish constitution would have been rudely shattered.

But the words "sepsis," "putrid," and "putrefaction" were ever upon his lips; they were the stock topics of his visits. As soon as he removed a dressing, of course under the then all-prevailing carbolic spray, he would anxiously smell it to see if it were sweet, then carefully smell all round its margins to see if putrefaction was creeping in from without; if all were well a quiet smile of satisfaction would light up his face and he would invite the foreigners who were present to confirm the fact.

With the words "foul" and "fœtor" all non-Listerites were only too familiar, for a surgical ward had a distinctive odour, some of the wounds being horribly offensive and all more or less so; but "sepsis" and "putrefaction" as applied to wounds were new terms, as no one previous to Lister had so used them.

They were the outcome of his epoch-making induction from Pasteur's researches that if putrefaction of organic substances was due to the action of micro-organisms, might not putrefaction in wounds be due to the same cause? In both heat was generated, tissues disintegrated, and gases liberated; it seems so trite and commonplace now but then it was an entirely new view. How many experiments had to be devised, how many problems had to be solved, and how many tangles had to be unravelled, only those who followed his work can know.

When Columbus has once reached America any mariner can follow, and every third-year's student can now glibly answer questions that it took Lister years to solve.

When one thinks of the ages that surgery had been practised, and that the treatment of wounds and surgical fevers had engaged the minds of many of the world's ablest workers, one wonders at the long-drawn-out delay. But as Huxley truly said: "Before man can get a move on, a new tool has to be invented," and without the improvement of the microscope, so largely the work of Lister's father, the mysteries of putrefaction could never have been solved. Little, indeed, could the old man have thought, whilst working at the then out-of-the-way problem of extended vision, that he was making the path along which his immortal son would travel in his crusade to liberate humanity from its age-long bondage. But a Pasteur had to be born ere Lister could initiate the new surgery, for it is by collateral knowledge that healing is most frequently advanced; frontal attacks are seldom successful, the causes too often lie in the regions beyond. We are always forgetting that man is but a part of the whole, and that there are more things in heaven and earth than are dreamt of in our philosophies. This is both the hope and the despair of medicine, and who is sufficient for these things? Now and again a meteoric mind illumines the darkness and we move forward.

Long before Lister's day antiseptics were unconsciously practised. Friar's Balsam found fame in the Middle Ages; amputation stumps were dipped in tar; and rough sailor folk bathed their wounds in salt and water. Corin, a shepherd in *As You Like It*, says: "Our hands are tarred with the surgery of our sheep;" and Bishop Berkeley, more than a hundred years later, in a fairly thick volume, extolled the drinking of tar water as a cure for evils innumerable. They were on

the German creosote tack but had not rounded the headland; but empiricism ripened into explicit knowledge, and rule-of-thumb practice blossomed into reasoned truth.

Tyndall has written upon "The Scientific Use of the Imagination." A problem presents itself and how can it be solved? Collect data and venture an hypothesis, or in more becoming language, make a guess! Give flight to the imagination, try this, try that, deduce, induce, guess again and try again! Edison has said: "Genius is 2 per cent. of inspiration and 98 per cent. of perspiration," and the more one studies the lives of the great, the more one realises their ceaseless labour. There is no such thing as "Science from an easy-chair"; without imagination there is little progress, and apart from labour there is no success.

Lister's mind was a researching one; he could not accept "hospitalism," it troubled him and weighed upon his soul. Why did it exist? Why was it particularly the curse of specially organised and carefully arranged hospital buildings where the highest skill and the best conceived conditions were available? Why was it rampant in those places where it might most reasonably be expected to be absent? In the cottage or the hugger-mugger home, where no provision existed for the special treatment of disease, it was at a minimum; whilst in the well-equipped hospital, with all that knowledge could provide, it reigned supreme!

It seemed to him the most pressing of all problems, before which every other surgical question paled. Whatever the surgeon's knowledge or operative skill his steps were dogged by this fiend and his triumphs blasted by its sway. Too frequently it would have been better

for the patient if he had never been treated. Lister could not rest, the problem caused an aching in his mind. . . . Here is the history of the birth of antiseptics as I heard it from his lips.

He was Erichson's house-surgeon at University College Hospital and an epidemic of hospital gangrene was ravaging the wards. (As he mentioned the words "hospital gangrene" his countenance fell, he heaved one of his characteristic sighs, his head fell slightly to the right side, his speech faltered under the emotion that its memory evoked, and the slight but not infrequent stammer appeared.) He described it: a wound took on a peculiar jelly-like appearance which was known to demand immediate amputation; a few days later the flaps were affected and a higher amputation had to be performed, only again to be attacked; a little later the shoulderless or thighless patient sank.

One night he could not sleep. He had been reading Pasteur's investigations into putrefaction, and the thought suddenly struck him, "Could it be that this trouble might possibly be due to some low kind of fungus attacking the wound?" He rose at 3 a.m., went into the ward, raised a dressing, smeared a little of the ichor on to a glass slip, took it to his room and examined it under the microscope. There was nothing there! He returned to bed and wearily fell asleep.

Why was it that Lister saw nothing unusual in that ichor? It was there but it was invisible; the aniline dyes had not been discovered; a drop of methylene blue would have made all the difference!

> "Oh! the little more and how much it is,
> Oh! the little less and how far away."

It is the old story : the healing art is advanced by the collateral sciences.

One thrills as one thinks of that epoch-making moment! Here was the birth of that scientific imagination which was to glorify the surgeon's work for all time, to rob disease of half its terrors, to rescue millions from death and restore them to health and usefulness, to pilot mothers safely through child-bed instead, as was so often the case, of their dying from puerperal fever, wrenched away from their dependent family in the flower of their womanhood, to light the shambles of the battle-field with hope, and to render safe the exploration and repair of every organ of the body.

This was in 1851, the year of the Great Exhibition which was pulsing the world with endeavour and hope. Seventy years have passed and Science has outdone herself and made for us a new world ; every department of knowledge is transformed, but all achievement pales before the revelation of the rôle the microbes play in our lives !

The span of life in this country has lengthened by a third since 1865. One wonders how much of this may be claimed for Lister, and where to-day should we all be but for his labours? It was he who drew the great induction that opened a gate to longer days.

And yet we are but on the threshold of attainment ; the more we search the more we discover that life is the victim of parasitism, that few die natural deaths, that the microbe waits for each and is assured of ultimate victory ; but the enemy is unmasked and his lines recede, and the Land of Promise opens before us !

Another matter that harassed Lister was "the

appalling difference between a simple and compound fracture, and what makes the difference.

A simple fracture comes to the hospital and no one troubles about it; the dresser on duty can almost deal with it. But should the bone pierce the skin, all is changed; the visiting surgeon may be sent for, the theatre lit up and amputation often performed, and what makes the difference?

John F. South, one of the surgeons to St. Thomas's Hospital, writing in 1853 on "Hints and Emergencies," after detailing the approved treatment, goes on to describe the case: "After three or four days the patient begins to get fidgety, cannot sleep or only gets short and disturbed sleep; he soon begins to be hot and thirsty, his head aches, he becomes more restless; has one or more shivering fits and usually becomes more ill towards evening; his mind wanders or he even becomes delirious, and dies in the course of ten days or a fortnight from the violence of the constitutional disturbance caused by the injury."

The subject weighed upon Lister's mind and none of the current theories satisfied him. In vain the trouble was attributed to air getting to the wound; but instinctively he felt it could not be that. Did not the ceaseless labours of the heart and lungs insure that air should permeate every tissue, the cessation of which caused speedy death? Plainly it could not be that. *But might it not be a something carried by the air, which was a very different matter!*

The conviction was settling upon his mind, through the researches of Pasteur and his own subsequent experiments, that putrefaction in a wound was a kind of fermentation, a breaking up of the tissues by microscopic

organisms preying upon them; that it was neither a post-mortem change nor an inorganic chemical action, but was due to the living activities of infinitely small forms of life hitherto disregarded and virtually unknown.

The Glasgow sewage was at this time causing trouble. It was collected in reservoirs and the effluvia was a nuisance to the neighbourhood; but it was found that if it were treated with a recently manufactured fluid called Crude German Creosote the nuisance abated.

The thought occurred to Lister that this creosote might be used for the same purpose on wounds, and he determined to try it. This was in May, 1866. He gave orders that the next time a compound fracture was admitted he was to be sent for. He had not long to wait, a compound fracture of the leg arrived and he went down with some German creosote. The wound was freely swabbed with the fluid and covered with a paste of the creosote made with plaster of Paris, the "plaster of Paris putty" he called it, which was spread over the surrounding skin and covered with a layer of tin-foil. To his surprise and delight the wound healed kindly under a scab, and there was a complete absence of any constitutional disturbance.

This was the first intentional antiseptic dressing that was ever used, and it formed the basis upon which all his many subsequent experiments were devised. He had been well trained in what was then known of chemistry by Graham, a master of his day, and this knowledge was turned to good account in all the many changes which the elucidation and evolution of a satisfactory dressing demanded. It was not long before the active principle of the creosote was isolated and carbolic acid quickly superseded its primitive ancestor.

The first time I heard the words "carbolic acid" was in 1870. One of my school-fellows, whose father was the secretary of University College Hospital, injured his hand, and was treated by a junior and progressive member of the staff by the new method. I had learnt a very little chemistry and well remember the priggish pride with which I corrected him: "No, not carbolic acid; you mean carbonic acid!" I mention this because it shows that what is now a drudge in every household was then a novelty unheard of by the general.

It was currently believed by us at Edinburgh that it was owing to Lister's interest in the creosote that the isolation of its carbolic acid was accelerated, and but for which, who knows, it might have slumbered amongst the now 300,000 definite carbon compounds that chemists have discovered and to which they are adding some 4,000 every year; the numbers seem incredible, but I learnt them from the lips of one of our greatest chemists at the Royal Institution.

The reputation of carbolic acid spread and progressive surgeons tried it; but as they did not understand the underlying principles they failed. They seemed to think it was a panacea that banished sepsis, and that the sprinkling of its lotion upon the wound and the smell of it about the room would work the charm. The ubiquitous nature of the microbe was unknown, and dirty hands, dirty skin, and dirty instruments were not even suspected. If only carbolic was present they thought that Lister taught that all would be well.

> "A little learning is a dangerous thing,
> Drink deep or taste not the Pierian spring;
> There shallow draughts intoxicate the brain
> And drinking largely sobers us again."

The pungency of the acid, its burning taste and caustic action intensified a faith in its potency and contributed to its downfall; the very ease, perhaps, with which its name, unlike so many of its fellows, could be rolled upon the tongue led to a careless and inconsequent use. London tried it and failed, and turned its back upon its possibilities for years, and had to be converted from Germany and America by men who had taken the trouble to go to Edinburgh and see Lister at work.

This is the story as I heard it from his lips at his lectures. His head would incline to the side, the pathetic sigh would be heaved, the slight stammer appear, and sorrowfully he would say: "Well, gentlemen, it is no new thing for me to be misunderstood."

To the dismay of the surgical world, in spite of the most influential requests from the British Association, the French Academy of Medicine, Europe, America, Japan, and the South American Republics, the Lister Ward in the Glasgow Royal Infirmary in which he made his epoch-making discoveries was demolished in May, 1924.

A small body of men on the governing body resisted the world-wide outcry and committed a vandalism it is impossible sufficiently to condemn.

However little "the practical man" may realise the fact, the money needed and the enthusiasm required for the cure of the sick are in large part the outcome of sentiment, and when one thinks of the loss to future generations one feels sick at heart.

Fortunately, very fortunately, the Wellcome Historical Museum in Wigmore Street, London, the magnificent conception and achievement of Mr. Henry

S. Wellcome, leapt into the breach and acquired as many relics of the original ward as it was possible to collect, and re-created them with meticulous care so as to reconstruct the ward and preserve its appearance for all time. The original fireplace, the central pillar with its round table, the actual beds, furniture, and many of the fittings are all transferred, and quite near are numerous portraits of Lister at various periods of his life, and cases containing pieces of his apparatus, chemical bottles, flasks, culture tubes, and other treasures.

In the rooms of the Royal Astronomical Society is enshrined a piece of the tree from which Newton is said to have seen the apple fall; the coat that Nelson wore at Trafalgar, bloodstained and riddled, lies at Greenwich Hospital; the original apparatus of Faraday and Cavendish is preserved at the Royal Institution . . . the list might easily be extended . . . and now, thanks to Mr. Wellcome, many of the Lister relics are in Wigmore Street. No one can look upon these things and be unchanged; they are footprints upon the sands of time!

CHAPTER VII

DESCRIPTION OF LISTER

LISTER was endowed with an excellent physique ; above the middle height and weight, he had a well-built frame amply clothed with muscle and inclined to stoutness, aided probably by the lack of physical exercise ; eminent doctors in Victorian days never walked, they rode everywhere. Foolish as it may now seem to us, the dignity of the professorship and of the professor would have suffered had it been otherwise.

Lister's carriage was a well-appointed pair-horsed open landau, the coachman demure, as conscious of its importance, the very horses themselves seemed sedate, the whole bespeaking a dignity in which the Professor looked the part to perfection. Nowadays bishops ride in trams and Harley Street rushes off in soft hats ! *Autres temps, autres mœurs !*

Buffon used to say : " Le style est l'homme même," and Lister's dress bespoke him ; in accord with the professional custom of the day he wore a black broadcloth frock-coat and waistcoat, dark-grey striped trousers, and a fine silk top hat which suited him admirably. Somehow I was always struck with the thickness of the soles of his boots, which seemed unnecessary for the work they had to do ; but the germ theory of disease had made but little progress, and perhaps Lister, like every

one of his day had an unreasoned dread of wet feet. It is strange how much was then said about "wet feet"; patients, gynæcologists, neurologists, and text-books considered them a potent cause of disease. Perhaps the thick boots were a remnant of maternal solicitude!

He was always carefully and neatly dressed, and the Quaker spirit of substantiality was unobtrusively evident. When one thinks of the modern specialist jumping into his motor-car in a lounge suit with his cigarette one realises how all has changed: by no stretch of imagination could one frame Lister in that setting.

His face, once seen, could hardly be forgotten. There was something so distinctive about it, such a blending of sweetness and power and purpose. Those who have never seen Lister can have but a poor idea of the height to which Homo Sapiens can evolve. I have always placed him in a class by himself.

I will endeavour to describe him though I know I must fail, as words do not convey the indescribable spell of his presence. His head was roundly well-formed and proportioned, and evidenced the embodiment of mental power and physical sufficiency; the forehead was broad, full and rather wrinkled; the eyes blue, soft, and sagaciously observant, suffused with tenderness and creased at the corners with the lines of those winning smiles which were so exceptional a feature; the lips were full, especially the upper, the left half of which had a slight tilt; the mouth expressive of rare delicacy of feeling blended with power of self-control—he had a way of working the lips and eyebrows which unconsciously revealed his feelings,—the lower jaw showed strength of purpose and power of winning through yet without a trace of combativeness; his complexion was fresh and

healthy, and gave one the appearance of persistent health. The lips and chin were carefully shaven to the limits of the prevailing "mutton chop" whiskers of the period, which were then iron-grey; a fine head of hair worn rather long fell behind in curling ends. Perhaps the least striking feature was the nose, which though well-formed was a shade small. Dignity, capacity, modesty, and tenderness epitomise the picture.

W. E. Henley, whom I have previously quoted, may well speak here:

> "His brow spreads large and quiet and his eye
> Is deep and bright, with steady looks that still:
> Soft lines of tranquil thought his face fulfil,
> His face at once benign and proud and shy.
> If envy scout, if ignorance decry
> His faultless patience, his unyielding will,
> Beautiful gentleness and splendid skill,
> His wise rare smile is sweet with certainties
> And seems in all his patients to compel
> A love and faith that failure cannot quell."

A patient once said to me: "When the Professor enters the wards I feel as though God Almighty Himself had come in"; and I knew what he meant, a feeling of absolute confidence that all the powers and nobility of his being would be devoted to the case.

No matter how trivial the subject, he would concentrate his attention upon it with an intensity that diffused its influence over all; to trifle or joke in his presence would have been impossible; every one came to "attention" when he was there, and it was some little time after he had gone ere the spell subsided and we "stood easy."

The most striking characteristic of his face was its smile. There are smiles *and* smiles, the Society smile

that means nothing, the smile of servility that anticipates gain, the professional smile that has become part of the make-up, but the smile that appeals to the sick is that of unaffected sympathy; everything about Lister falls into shadow as one thinks of that smile. It went to the patient's heart and nerved him with strength, it flooded his mind with confidence and hope; he felt that his was no mere "case" but the personal concern of a friend as well as of a supreme healer. The words which Rénan has beautifully written in another connection, might well be applied to Lister: "As happens frequently in the case of very lofty natures . . . tenderness of heart transforms itself into an infinite sweetness, a vague poetry, a universal calm."

And yet in spite of his attractive charm he seemed to us to be surrounded by an atmosphere of indefinable separation that forbade familiar approach which neither time could bridge nor custom abate. I have since learnt that all his life he was troubled with a constitutional shyness of which he was painfully conscious and which was to him a source of embarrassment and regret, and it explains much. But there it was; we were never quite at ease, never quite at our best; shyness is infectious, it arouses self-consciousness and embarrasses behaviour; just a tinge of geniality would have made so much difference!

He was one in whom the elements did so sweetly blend that he seemed the embodiment of a Christian gentleman. I have studied in four universities, known many of the eminent doctors of the day and seen many of the intellectual giants of the period, but the figure of Lister stands out from them all unfading through the mists of time.

But over him there seemed to hang a cloud of sadness; maybe there was a tinge of melancholy in his soul, many of the greatest have been so oppressed. Maybe it arose, certainly it was intensified by the responsibility he felt in his work. He knew that in the surgeon's hands the issues of life so often lie, that pebbles turn streams and feathers incline balances.

Every doctor must from time to time have suspicions if not qualms that greater care, deeper thought, or other methods might have led to happier results; it is inevitable in the practice of medicine. He cannot abolish death, and in the daily conflict he suffers repeated defeat; but so much has been achieved, so often has the foe been thwarted, that his mind unconsciously assumes the possession of greater powers than he has, and in the nature of the case he is always striving after the impossible.

I am sure Lister felt this and that it weighted him with an anxious sadness from which he could rarely escape. He was never off duty, and when he remembered the horrors of the septic past and saw around him the triumphs of his work, he could not but feel that endless further possibilities lay around, and that increased effort, fuller research, and renewed application might compass them; there is no finality in the work, the mind is ever searching and reaching, but still

> "the margin fades
> For ever and for ever as we move."

Constantly he would say to us: "Put yourself in the patient's place. What would you wish to have done were you in his case?" Surely a standard enough to paralyse any one. Others of my teachers may have felt the same responsibility but Lister was the only one who

ever referred to it, much more unfurled it as a standard for daily work which should admit of no compromise.

Again, "Every patient, even the most degraded, should be treated with the same care and regard as though he were the Prince of Wales himself."

A fellow-student once said to me: "I believe Lister thinks that every patient has been sent to him with God Almighty's visiting card!"

This was the spirit in which his work was done. I have never known any one who worked under such an evident sense of responsibility; his life was consecrated to the relief of suffering. Of course he had his triumphs, no man more so, bright and radiant moments when his face was suffused with delight; but like Bunyan's "plain called Ease it was but a little one and they were soon over," and the next case brought its new care. Keats has said this is a world "where but to think is to be full of sorrow," and the heedless may have quiet times; but to those who, like the Great Prelector of Sympathy, are "moved with compassion" it is otherwise. It was this that probably led Lister to medicine, and was the source as well as the cause of his success. Small wonder that he so often seemed grave and careworn.

Never did he show any sense of boredom or impatience; he would listen with entire attention to every word a patient uttered, everything was important, every detail was a factor.

His voice was soft and somewhat low, his speech was simple and deliberate and often seemed an effort; of oratory he knew nothing, and yet if such be judged by its effects it was his in measure, as acceptance followed all he said; it was the eloquence of conviction, of one moved by concern! Occasionally he would stammer as

feeling grew intenser; it was not painful to others and like all stammering it varied; some days we hardly noticed it, on others he would hackle over a word, draw a deep breath, drop his head to the side and get it out. It was evidently painful to him, but it served to emphasise his words and arrest our attention; it was an old enemy and though subdued was never conquered, and he always seemed to be on his guard against it.

He had a way of sighing, too, that was characteristic; no one could have worked with Lister without admitting it was a part of the piece, it was a deep, quiet sigh, the head falling to the right. It may have been a way he had learnt of overcoming his impediment; it may have been an echo of his sadness. An anxious moment, a pressing problem, and the sigh would appear. Of course it was physiologically sound, heightened brain action, more oxygen; the sigh and bending head, and we knew a judgment was impending, a solution emerging, an error detected, and the first words invariably were: "Well, gentlemen . . ."

Next to the face critics say nothing is more speaking than the hands: portrait painters might be graded by the power they display of depicting them, and Lister's hands were characteristic.

Strong, full, kindly hands, quiet, capable and serviceable, carefully trained to special purpose, they were not especially gifted either in form or in action, hands to which one could trust oneself feeling they would do their work but not adventure.

Of course it was the "antiseptic hand" of those days, roughened by the use of strong carbolic lotion. He would smile and say he could always recognise his friends when he shook hands with them, their rough dry hand

told the story. The use of rubber gloves was then undreamt of, and it is an ugly reflection to think of the nidus the cracked skin and frayed nails must have been for the inimical microbe, and it speaks volumes for the power of carbolic acid that it prevailed over these pitfalls; had it not the success of early antiseptic surgery would have been impossible.

CHAPTER VIII

CHARACTERISTICS

HANDWRITING is said by those who have studied it to reveal character; it is a part of the whole, and everything about us reveals something of what we are, our walk, our voice, and even our back will disclose much to those who question them; unconsciously we sum up an individual and trim our sails accordingly. No wonder, then, that handwriting reveals character, considering how much of our intenser mental life flows down the pen.

The handwriting of Lister is strangely characteristic; with so simple and transparent a soul it could hardly be otherwise. The first thing that strikes one is its almost schoolboy simplicity, every letter is formed and every word is clear, there is no hurry, every "i" is dotted, every "t" is crossed, every "e" is looped, the words are evenly spaced and the line runs horizontally across the page, there are no flourishes, no extravagancies, no eccentricities. Commas are appropriately placed, full-stops terminate each period, and the almost forgotten semi-colon is not omitted. Had we never known him we could have learnt much of his mind and character by his writing. Careful, exact, simple, devoid of display and self-assertion, intent on conveying a clear and reasoned message. It is strange how almost child-like the writing is, as though the bustle of the world had

beaten harmlessly against him and never effaced the rigour of the copy-book but left him as it found him, a simple, earnest soul, trying to do his best and write his copy nicely.

One of his most notable characteristics was humility. Doubtless it was a natural gift, but it was fostered also by an abiding consciousness of the limitations of knowledge and an overpowering sense of the mystery behind phenomena. It is only the sciolist who can be conceited. This humility was strikingly shown early in his career. He came to Edinburgh to see the practice of Syme, and although he had had a brilliant career at the University of London and had taken the Fellowship of the College of Surgeons and served as house surgeon to Erichson at University College Hospital, he accepted another house surgency, almost a student's appointment, under Professor Syme.

I have never heard of another F.R.C.S. being a house surgeon, and believe it is unique; but Lister recognised in Syme the skill and the art of a master from whom he could learn, and sank all dignity to better his knowledge and improve his technique. Let any of my professional readers recall their early qualified days, the confidence they had in their opinions and their frequent irreverence for the works and ways of their seniors; it was only experience that mellowed them. Fancy an F.R.C.S. attending to the out-patient casualties. Probably no one but Lister ever did it. On only one occasion in the two years I worked under him was there anything approaching the nature of a boast, and that in an unassuming and jocose manner. He was speaking of the importance of the drainage of abscesses and referred to the time when he was called to Balmoral to operate upon Queen

Victoria for an axillary abscess, and playfully said: "Gentlemen, I am the only man who has ever stuck a knife into the Queen!"

I never saw him elated or knew him laugh, nor do I ever remember any expression of triumph; whatever he might achieve he seemed to think inadequate, perhaps it might have been done better; and any success that gave him pleasure was regarded more from the point of the patient's advantage than of personal satisfaction.

But over him there hung a cloud of seriousness tinged with sadness that tempered all he did, an overwhelming sense of responsibility that lay like a burden upon his soul and from which he seemed unable to escape.

Biology in those days was only slowly emerging, and was largely concerned with structure and classification, a philosophical view of life had hardly been formulated. Weissman had not enunciated the continuity of the germ plasm, and the "soma" instead of being regarded as the vehicle of the deathless reproductive cells was viewed as the guardian of the immortal spirit; and death, the indispensable ally of Nature and an inevitable part of her scheme, was looked upon as an avertible calamity due rather to the imperfection of treatment than as the inexorable termination of the life processes.

Doubtless it was a salutary view and stimulated effort, but it cast an undeserved humiliation over practice. It was not actually taught, but tacitly implied, and we were led to believe that a few grains of this or that salt dissolved in an ounce of water and taken three times a day were calculated to avert the last enemy. A prescription was solemnly altered: ten grains of bicarbonate of potash or three grains of iodide of potassium were added, and we waited hopefully for the change. I write of

fifty years ago, but the idea is not dead. We were taught to treat in hopefulness perfectly incurable diseases, and chronic Bright's disease or locomotor ataxy were prescribed for with the same assurance as a mild case of measles or a temporary gastric disturbance.

I remember when I qualified at the College of Surgeons, marching back to St. Thomas's and going into the dispensary to announce my success to the head dispenser, for whom I had a liking. He was not there but I distinctly remember gazing round at the bottles upon the shelves and thinking to myself: "Here is a remedy for every disease, and if my patients die it will be because I have selected the wrong bottle;" it was the logical outcome of our teaching.

There was quite a general idea that every disease had its natural remedy which had passed down from the Middle Ages and was considered to be in a very especial degree the property of the vegetable kingdom. Lungwort (*Pulmonaria Officianlis*) had for centuries been supposed to be the natural remedy for phthisis because it bore on its leaves pale oval patches that resembled the diseased lung; the old herbals are full of such things and the idea lingered in men's minds. Many a time I have heard patients say, that "For every disease God Almighty sends He provides a remedy"; and here the work and the responsibility of the doctor lay, and as the triumphs of medicine multiplied the idea grew that having done much it should be able to do more.

In a sense, but in a limited sense, this has a tinge of truth and is an incentive to research and effort; but on a mind like Lister's, poised to vibrate to the tender chords of sympathy, it took its full toll of anxiety and care, and clothed him with a garment of sadness which he

seemed seldom able to discard. His very successes, moreover, added to his burden when he thought of what he had been able to do and then considered the unconquered regions! No wonder he so often looked so sad, and sighed and plaintively said: "What can we do for this poor man?"

His voice was soft and rather weak, and he never spoke loudly; one can hardly imagine that even as a boy he had ever shouted; it was clear and sweet, and his words were slowly and deliberately uttered—simple Anglo-Saxon, devoid of all extravagance. He often seemed to have a difficulty in expression and spoke as though the words were chosen after careful thought. He never lost his self-control or showed the faintest trace of anger; mistakes would grieve him but he never chided.

I have mentioned the atmosphere of indescribable distance which enveloped Lister, the outcome probably of a natural shyness of which the occasional stammer was possibly a part, and I must speak also of his scrupulous politeness, which was so marked a feature of his character. In a measure it was a product of the Victorian Age, which was an era of rigid distinctions, and a professor was no exception to the rule and was enshrined in a halo of reverence quite other from that which surrounds him to-day. But making allowance for these there remained a surplus of natural and spontaneous politeness that added grace and charm to all that he did, but which though to us so courteously intended was nevertheless a barrier and embarrassment, and made us always ill at ease. To him we were always "Mr. ——"; other surgeons called their dressers by their surnames, which engendered friendliness and ease;

but the "Mr." kept us at a distance which was never bridged. We could not forget ourselves and be simple and natural, and I do not think it was good for us, as the best qualities of heart and head can only unfold themselves in the absence of constraint. But so great was his influence and the infection of his example that we all fell more or less into the same strain, and there was little friendship or association amongst us dressers and hardly any *camaraderie*. Youth is impressionable and its impressions are lasting, and though fifty years have passed I still feel that perfunctory "Mr." pressing at times upon my lips and have never been able to rid myself entirely of the tangle; it is a vestigial remnant and bears witness to the enduring power of Lister's personality.

I suppose Lister had his friends but we never saw them; foreign professors were often in the wards but his colleagues never, and it argues ill for human nature and its bane of pride and prejudice. The demon sepsis dogged their steps and blighted their most brilliant operative triumphs, yet in the same building its reign was ended and a single morning's round would have convinced them! But they never came; one is sorry for what they missed and sorrier still for their patients.

Few things are more harmful than complacency and the self-esteem that ignores the work of others, it has but too often retarded the healing art; but looking back, what a tragedy it was and how contemptible it seems. Here were foreigners flocking from the ends of the earth to study the new methods, and Lister's colleagues turning the cold shoulder upon it all! Granted there is a virtue in old-time prejudices and that they have occasionally a survival value, but it seems incredible that Harvey lost most of his practice when he discovered the

circulation of the blood, and that Lister's work was flouted by his next-door neighbours.

But the junior staff was converted; Drs. Miller and Bishop, who were assistant surgeons, were enthusiastic disciples, and so especially was Dr., afterwards Professor, John Chiene, who acted as Lister's private assistant and was an earnest worker in developing the new method. He took charge of the wards during the Professor's absence, and it was strange the difference it made. There was no "Mr." then, we were a team working comfortably together and happily at our ease. We asked questions, discussed cases, had even an occasional joke and sometimes a little tale; but immediately the Professor appeared we were on parade duty. Perhaps, after all, it may have been good for us, certainly it intensified and solemnised our work, but it was rather trying all the same.

And yet the unapproachable distance, the invariable politeness, and the natural dignity were probably factors in the spread and acceptance of the new theories; with an easy-going familiarity they might have missed their grip; it was the solemnity with which they were invested that gave them such weight and compelled the necessary attention to the meticulous details that ensured success, and one is inclined to admit that without the cogent and compelling personality of the founder antiseptics could hardly have made good.

He never spoke of his colleagues and they played no visible part in his life. The only Edinburgh surgeon he ever mentioned was Dr. Thomas Keith, a well-known operator in women's diseases, who after adopting antiseptics rose to world-wide eminence as an ovariotomist. I have spoken of the terrible mortality in London, so high as almost to suggest abandonment; but in Keith's

hands, following Lister's methods, the operation passed from one of extreme danger into one of tolerable safety, and later into certainty and success. I never saw an ovariotomy at Edinburgh, as Lister would often say how wrong it would be for him to operate upon a case when such skilled hands as Dr. Keith's were available. It used to strike me as strange, this public confession of departmental inferiority, but the day of the specialist had hardly dawned. I have seen cataracts extracted in the ordinary wards, and all surgical cases were dealt with as a matter of course; to have suggested they could be better treated by others would have compromised the surgeon's position. Ovariotomy, too, was considered the province of the general surgeon and denied even to the gynæcologist. Judge, therefore, of our surprise when Lister declined such cases! But here, as always, he counted his own reputation as nothing. "This poor man," "this poor woman," were all that mattered.

Ovariotomy was perilous and antiseptics had turned the scale; how natural it would have been for him to have seized it as a vantage-ground for the display of his methods. But no, "Whilst there is in this city such a master-hand as that of Dr. Thomas Keith it would be criminal for me to operate." Small wonder that he exercised such an ethical sway over those who worked for him and that he left an abiding impress upon their characters.

Another unique characteristic was his habit of lecturing upon his mistakes. The architect is unfortunate in that his errors endure and testify to his limitations, but the doctor buries his failures; professional mistakes are usually regarded as legitimate objects for defence, and awaken ancient reflexes of self-preservation which

beginning in the nursery follow to the school and usually persist throughout life, and "not guilty" is ever upon our lips! You can imagine, then, the astonishment when one day at the close of a lecture Lister quietly announced that at our next meeting he would lecture upon the mistake he had made the day before.

It was a bad case of goitre and the removal of the diseased gland had lately been attempted; the operation was new and there was little experience to guide, the method being that of simple excision of the growth. The hæmorrhage was appalling and the patient died. Lister was deeply moved: he had not contemplated disaster, and on reflection it occurred to him that had he ligatured the thyroid arteries before he removed the gland, a life might have been saved.

I remember his pathetic remorse and how he blamed himself for his want of caution. He told us he had read up the anatomy before the operation, but was quite unprepared for the deluge of blood, and that in future he should ligature every vessel before the removal of the gland. Plaintively he impressed upon us the importance of always studying our mistakes and never glossing them over, and of pointing out to others where we had gone wrong and so avoiding a repetition.

That lecture could hardly be forgotten, but think of the courage required and the moral elevation it bespoke for the Regius Professor of Clinical Surgery to confess his error, and expatiate his mistake before the largest clinical class in the kingdom, to say nothing of the distinguished foreigners who were present, and he the most critically scanned surgeon of the day, and at a time when he was initiating a new system which the heads of the profession rejected. But the relief of suffering was

the passion of his life and in its pursuit his own reputation was as nothing; the welfare of the sick was all that mattered.

I gathered from little things dropped here and there that he had rather a qualified opinion of the profession, some of whom he thought were poorly educated, and some insufficiently actuated by those standards which he considered essential for the proper care of the sick.

It was not a mercenary age so far as doctors were concerned; very, very few ever retired upon their earnings; many did an enormous amount of gratuitous work for the poor and hardly less for those whom they knew could never pay them, and it contrasted favourably with the "business-like" methods of to-day. Looking back over fifty years one cannot but feel that the profession has been tinctured with the commercialism of the age; but Lister could not ignore culpabilities either in himself or in others, and it led him on occasions to comment on flagrant want of knowledge or care. He did not accept the professional fetters that gloss the practitioner at the patient's expense; humanity overrode cloth and the sufferer was paramount. Of course, the comment was in technical terms, as the patient's feelings were scrupulously regarded; the past could not be remedied, but we, at any rate, might learn to our profit.

Strange to say, I never heard of any one asking him to meet them in consultation. I simply record my own experience, but I should imagine he would not be a very popular consultant and certainly not a fashionable one, he was too great a man for that; his natural dignity, reserve, and elevation were against it. One cannot consult with a deity! On several occasions I sent for him because I felt he was the right man, but I did not

relish the prospect and remember (with shame) the feeling of relief when I learnt he was away. It was just that little lack of ordinariness that was the crux, but how could one discuss a case with him? I cannot picture the scene. Later on, when the importance of antiseptics was recognised, the great sought his aid; but he would have been a courageous practitioner who would have suggested Lister; he would naturally turn to one less eminent and easier of approach, and with whom he would be more at ease.

Of one thing I feel pretty certain, that Lister did not hanker after money. Probably he never felt the pressing want of it and was possessed of some private means; also in Edinburgh the Chair of Clinical Surgery was a valuable one, the class fees running into twelve or fifteen hundred pounds a year. Of course, his expenses must have been heavy: he lived in good style and the house in Charlotte Square, the carriage and pair, and the entertaining of foreign guests entailed considerable expenditure; but I am sure he never viewed his profession in the light of pecuniary reward, and his absorption in his work left little time for those considerations necessary for the accumulation of wealth. Probably he inherited money from his father; the "Friends" are provident and thrifty, and his father had prospered in business; his wife also was a daughter of Syme. But when he died in 1912, at the advanced age of eighty-five, he left only £66,166, and of that he devoted no less than £60,000 to public uses: £10,000 each to the Royal Society, King Edward's Hospital, King's College Hospital, and University College Hospital; and £20,000 to the Lister Institute. Call no man good till you have read his will! Poor fellow, he had no children to whom he

could leave his money. But what a comment upon his life!

The Royal College of Surgeons in its Annual Report for 1912 on "The Passing of Lister," says: "His work will last for all time, its good results will continue through all ages, humanity will bless him for evermore, his fame will be immortal," and yet only £66,166, and probably a fair proportion of that from private sources.

A few eminent doctors have amassed wealth: Sir William Gull left £344,000, Sir Erasmus Wilson £264,000, Sir Andrew Clark £204,000 . . . but Lord Lister £66,166!

Think of the enormous fortunes made by business men. I will not mention names, it might gratify their shades, but a list lies before me: a brewer, £7,000,000; a tobacconist, £2,918,114; a furniture manufacturer, £2,158,292; a manufacturer of a proprietary breakfast article, £4,294,423; the proprietor of a quack pill, £1,311,000; and what was the value of their goods to the race?—indifferent, or positively harmful; and then think of Lister's boon to humanity, his unique triumph over suffering, *given* to the world, nay more, painful years spent in persuading men to accept it.

Ah! no, the current of his life was far removed from the amassing of wealth, it flowed in other channels; it sprang from those streams of sympathy which flooding his soul started his quest and dominated his life; no more compelling emotion can actuate conduct, it is the root of virtue and the graces, the only panacea for the world's woes; if ever the Kingdom of Heaven materialises it will be at its bidding! Occasionally it transfigures a life which is irradiated with glory.

How often would he say: "Gentlemen, what can

we do for this poor man? It is not what the books tell us, it is not what we should answer at an examination, the only question is: 'What would we like if we were in his place?'" We heard it again and again in varying words but ever the same: "What can we do for this poor lad? Nothing less than we would do if he were the Prince of Wales himself."

On one occasion when about to operate upon the breast of a young woman he pathetically surveyed it, paused, his head as always when in earnest thought inclining to the right. He sighed and turning to us said: "Gentlemen, how sad it is to have to cut into this beautiful mamma!" I had never heard the word "beautiful" applied to the mamma before; it was a new thought, but how true it is. Doubtless he was unconsciously admiring the exquisite unity of form and function in Nature's marvellous provision for the life of the race. It is the harmony of structure, the balance of proportion and the blend of utility that awakens the sense of the beautiful, but unless the mind be tuned to the measure it is unheeded; there is no beauty in the landscape unless there is beauty in the mind. It was a window to his soul and shows an æsthetic side of his nature, but in the grim realities of the operating theatre it seemed unusual. Yet who can doubt its effect on the minds of those he was trying to train. He then carefully planned the incisions so that the nipple might be left, turning to us and saying: "Poor creature, it will be a comfort to her and will lessen the severity of her loss if we can leave her that." How strikingly it reveals his pity and pathetic concern!

It may excite surprise in non-medical readers to learn that notwithstanding his tenderness and anxiety to

obviate unnecessary suffering Lister was nevertheless a convinced vivisectionist; but a little thought will show that it was this very pity that drove him to inflict the smaller pain upon the lower creature in order to avert a greater pain upon the higher.

Much of his physiological work could never have been done without vivisection; the study of inanimate structure can never reveal the mystery of living action. His classical initiation of cat-gut ligatures could never have been established without direct appeal to living tissues; but though he tied the carotid artery of a horse with animal tissue and thus revolutionised for all time the treatment of bleeding vessels, he did not forget to place tins of water upon the leads of his house for thirsty summer sparrows!

A madman once said to me: "Are you Allopathy?" I demurred and said, "No, not exactly." "Then you are Homeopathy, I suppose?" "No, certainly not that," I replied. "Then possibly Electropathy or Hydropathy?" "Well," I said, "I don't quite know what I am; I try and adapt any measure I believe will be for the benefit of the patient; I am not bound by any system, because medicine has none." "Ah!" he said, screwing up his eyes and making strange contortions, "the thing for the patient is sym—pathy. That is the Pathy for him." In Shakespeare's words: "He had some strange message to deliver us, ay, some mad message," but he sounded a note we might all attend.

Lister was certainly a deeply religious man. All he did was actuated by the highest motives. He seemed to us the embodiment of the Christian virtues, nothing to him was common or unclean. Born of Puritan parents and schooled by "Friends," he never lost their

impress; but his religion was of a very different type from that which was current in his day; it was a life lived rather than a creed spoken, and what his views upon the dogmatic theology of the day were we knew not. And it seemed strange, as Scotland was then saturated with sectarian fervour and divided into camps of religious thought which pervaded all sections of the community from professors to landladies who, with few exceptions, tenaciously held the tenets of their sects, around which both their friends and businesses were grouped; even the patrons of the University Chairs were at times suspected of bestowing their favours upon those who owned the sectarian sway of their fancy.

But Lister moved apart from all, his mind bore no trace of being cramped into the pill-box of a creed; his religion was not lip-service to sterile metaphysical statements, it was the dedication of a life.

In many ways he resembled Socrates; in his passion for truth, in his recognition of the limits of knowledge, in his calm and enduring courage, in the paramount importance he attached to conduct, in his belief that wrong-doing was ignorance, and in the magnetic influence he exercised over his followers, he, too, had his "divine voice," a tender and sensitive conscience.

I have often said I have never known any one who seemed to be so fully influenced by the teaching and example of Jesus of Nazareth. Here and there we meet with people who resemble each other physically, though their mental characteristics are rarely if ever duplicated; but how closely in his case did the disciple resemble the Master, in concern for the sick, in sympathy for the erring, in sweetness of mind and heart, in patience under

misrepresentation, and in natural and unassumed dignity.

When he married he left the Quakers and joined the Church of England; but I do not think that organised religion had much attraction for him, as he never associated himself with public religious efforts although evangelical zeal was rife then in Edinburgh, reaching many of the undergraduates, and markedly pervading the members of his class. But their societies received no encouragement from him, and they wondered why, as many of the professors took active interest in such matters, and this made the attitude of Lister the more remarkable. One would have thought that his saintly life, consecrated to the relief of suffering, would have led him to encourage those who, whatever their limitations, were certainly trying to leave the world better than they found it; but he held aloof and we did not understand it.

Clouds were gathering upon the horizon, Biblical criticism was advancing, Darwin's conclusions were gaining ground, and though the old bulwarks were hardly assailed yet many who were held by what was then called orthodoxy were beginning to feel uneasy. What did Lister think of these things and how did *he* view them? Many of his students would have given much to have known, but their oracle was dumb! and neither by word nor action did they obtain any guidance from him.

On only one occasion did he open a window through which we could peep into his mind; in his address to us graduates in 1876 he said: "It is your proud office to tend the fleshly tabernacle of the Immortal Spirit."

Writing in 1926 it must seem strange to be trying to fathom the theological beliefs of the Professor of Surgery, but times have altered and values have changed. I want to draw a full-length portrait of Lister and cannot omit the background; every man must be viewed in his historical setting. All we could gather was that he believed in an "Immortal Spirit" which dwelt in a "fleshly tabernacle," and this was a very thin and attenuated creed compared with that which was currently held. Those who have not lived in Scotland in the 'seventies will not realise this. Scotland then believed in many more things which it would have been as wicked to doubt as it would have been impossible to practise.

I have since thought he may have been influenced by the Zeitgeist. The doctrine of evolution was gaining ground, Darwin was revolutionising thought, Herbert Spencer was reconstructing philosophy, Huxley was hurling his thunderbolts at the bishops, Tennyson was transmuting the findings of modern science into infectious poetic expression, Lyell had transformed the conceptions of geologic time, and Colenso had shaken the interpretation of the Pentateuch. Lister must have known these things, he could not have missed them, they were freely discussed, a ferment was working in men's minds, and maybe it gave him pause, shifted old land-marks, and left him sure only of the truth and beauty of Christian goodness.

A point to be mentioned was his Sunday visit to the Royal Infirmary. Shortly before one o'clock he would appear, having walked from St. John's Episcopal Church after morning service; it was the only time we ever saw him walking out of doors; he would make a short

round, dress a few of the worst cases, and have a general look over the wards, planning the work for the week. We dressers and clerks liked these unofficial visits, the foreigners were absent and also the ordinary students; we came into closer contact with him and at times he would be almost chatty, and flower-like we expanded in the sunshine. The visit was a short one and no serious work was done, but it was a daring thing to do in Scotland's capital and was viewed askance by some as a "breaking of the Sawbath."

Those who have never known Scotland in those days can have little idea of what Sunday meant. Blinds were drawn, streets were empty, public conveyances were almost absent and the few available ones charged double fare; the city was hushed in solemnity, taking its theological rations very seriously.

No one but Lister would have dared to do it, and it was only his unquestioned sanctity that silenced the critics, but we all felt a little nervous and feared we were tasting forbidden fruit.

I have no idea what were his political opinions; the Franchise was then narrow, and the high game of chess was played by the comparatively few.

He took a liberal amount of holidays, and latterly spent much of the time at Lyme Regis; he was attached to botany and knew a good deal about wild flowers.

His influence upon his pupils was profound. Medical students were in those days supposed to be a wild and reckless set. It was a slander, and neither at St. Thomas's nor at Edinburgh was there any ground for the charge. Of course, a few were lazy and a very few rowdy; but by far the greater number had too many examinations ahead to waste their time or indulge in folly.

But Lister's pupils were a very serious set; he invariably attracted the best men of the year, and they quickly became infected by his example.

No one could work under him without receiving a moral uplift; there was that about him which engendered seriousness; also we were placed in a peculiar and unusual position, as we knew that we were individually concerned in the success of the new treatment, and that any failure on our part in the meticulous and novel technique would bring disgrace upon the cause. We knew how coldly his discoveries had been received; but that only put us upon our mettle and invested us with a responsibility such as few medical students can have felt. His influence upon us was overpowering, and we were carried along with it like iron filings in a magnetic field, the lines of force that radiated from him oriented all.

I have never met either nurse or doctor who had worked under him who did not bear the impress of his influence or whose patients were not the recipients of his indirect example; to have the care of the sick after his teaching was to work under an added responsibility. Few callings are open to more temptations and none demand greater sacrifice; in an overwhelming number of our cases there is no supervisor, critic, or court of appeal, and the demands upon our physical endurance are at times overpowering; that extra evening visit that ought to be paid but one is weary, perhaps one had been up the night before; that matter which ought to be done, but time is pressing and payment uncertain; that hurried diagnosis based upon insufficient examination; that time frittered away in listening to the useless talk of the friends which could be better spent with the patient;

these and others will be only too familiar to all who have had the care of the sick. But how did they appear to those who had been trained by Lister? Either a heightened sense of duty drove them to overcome, or they rankled in their mind as the silent monitor suggested: "What would Lister say to this?" the presentiment of his distress, the wistful look of anxious sorrow! The power of a force is judged by its effect, and what greater tribute can be offered to his memory?

I have heard it said that Lister was not really a clever man, and I think I know what was meant; in the sense of adroitness and mental dexterity I might agree. He would not have succeeded as a politician, nor as a barrister, and would have made little headway either at the hustings or with a jury; the overstatement of a case, the one-sided presentation of a fact would have been impossible, and if cleverness connotes agility of thought and rapidity of escape from doubtful positions I should concur. His mind worked more like the chess player's than the whist player's, it was essentially logical, and the output was reasoned conclusion, not rapid arrival by conjectural leaps, but careful process of ordered sequence: brilliance and dazzle appeal to the many, the forgers of mental anchors to the few. He seldom made mistakes and never blundered into errors; it was ordered progress not dash or hazard. The word "clever" has too many questionable associations, but if one turns to the word "ability" Lister comes to his own.

A carefully trained and furnished mind, looking before and after, weighing, pondering, and assorting data in the unswerving search for truth, and one views rightly the working of his mind; but that is by no means all. Over this efficient machinery there brooded an

inspired imagination which soared into undreamt-of regions, sighted El Dorados, and evolved schemes for their possession.

He had no children. How many of the leaders have left no descendants? Meteor-like they blaze for a moment leaving the darkness more noticeable. Some of his pupils named their sons after him, a striking tribute to their piety. But perhaps Nature is kinder than she seems; her rôle is mediocrity, she does not duplicate her masterpieces; better a blank than a child adorned only with a name, a travesty upon its parent.

Lister was an Englishman, born in Essex and educated in London, and Scotland was his adopted home and he married a Scotch lady; it is interesting to try and discover the opinion he had of the Northerners.

I am sure he admired them and I think he liked them; their earnestness appealed to him; he understood their lack of emotional expression, and their quaint ways of expressing their feelings would quietly amuse him. He would say: "When you ask a Scotchman how he is, and he says 'I'm nae worse,' that always means that he is better."

Sometimes he would playfully imitate their speech and anticipate their answers, and this being done in a kindly way, generally evoked an apt response. He enjoyed their humour and preened himself upon the fact that he fully understood it. He often referred to the melancholy of the Highlanders, which he attributed to the stern gloom of their mountain homes.

He had a high regard for the professorial staff of the University and considered they were men of marked attainments. It was rumoured that in his earlier days

he had enjoyed their convivial meetings, and it was said that on occasions he had actually sung them a song; but those days had long passed and the idea that he had ever indulged in such diversions seemed inconceivable. He liked Edinburgh and appreciated its beauties and advantages, and the days that he spent in the city were probably the happiest of his life.

CHAPTER IX

AS PROFESSOR OF CLINICAL SURGERY

THE operating theatre of the Edinburgh Royal Infirmary was a large one, after the manner of those days, but it exceeded the usual limits as it was capable of holding some four hundred students, who took their places in ascending semi-circles. It was here that Professor Lister's Clinical Lectures were delivered. The wards of which he had charge were chiefly upon the first floor of the hospital, and the way from them to the theatre lay down a long flight of stone steps flanked by an iron railing and rather badly lighted; a dreary uninteresting spot; but here occurred an incident the issues of which were stupendous and it was over in three seconds.

The part Sir James Simpson took in the introduction of chloroform is well known. The idea was transcendent, sleep in a maelstrom of agony, and Syme ever alive to progress was anxious to try it. He discussed the matter with Simpson and arranged that at his next serious operation Simpson should send him some chloroform.

A case for amputation of the thigh arrived, and as it was in a strong man it was considered a suitable case for the test.

The bottle of chloroform was given to the clerk and placed upon the instrument tray to be taken down to the

theatre. In descending the long flight of stone steps the clerk slipped, the contents of the tray were scattered and the bottle of chloroform smashed into atoms. The operation was proceeded with, and the man died on the table!

One trembles to think of the issues that hung on those moments. Had chloroform been administered it would have been difficult to have avoided the conclusion that it had killed the patient, and he would have been a bold man who would have given it a second trial, and the subject of general anæsthesia might have been relegated to the unfeasible. We can never be sufficiently thankful that the administration was not attempted.

We can hardly imagine a world without chloroform, and are so accustomed to its use that we fail to picture life without it, and when we consider that under its cover surgery has invaded every region of the body, we cannot but regard those stairs as a pivot upon which swung in that fateful moment the awful future of suffering humanity. Could the millions who have been delivered from surgical torture but realise what that "slip" foreshadowed, the stairs might well become a Scala Sacra, a veritable shrine of pilgrimage!

But to return to the theatre, a large, lofty, square apartment, bald and formal, lighted by a large window on the north side under which a spacious blackboard and leaden sink were fixed. It will surprise the reader to learn that there were no basins for washing hands, such matters were not considered; in the centre of the worn and blood-stained floor, sprinkled with sawdust, was the operating table, an ordinary kitchen table devoid of any accessories; a semi-circle of hair-

stuffed chairs that had seen years of service were placed around the front of the arena and were generally occupied by foreign professors who had come to see and study the new treatment.

To us students these men were a source of curiosity and wonder; their closely cropped hair, heavy moustaches, spectacled faces, and strangely cut coats, generally with an attempt at a waist, made them quaint figures in a Scottish audience; some were staying with Lister, but others had only letters of introduction to him.

It was an interesting succession of Germans, Swedes, Norwegians, Frenchmen, Italians, North and South Americans, Japanese, and other unrecognisable nationalities; but English and Irish hardly if ever, a sad comment on our professional conservatism. Truly a prophet hath no honour in his own country!

His colleagues were conspicuous by their absence; they either ignored the innovation, derided it, or attributed its results to drainage and careful dressing, whilst the fact remained that their own wards in the same building were ravaged by pyæmia and septicæmia, but Lister's were free from these scourges.

I once heard Sir William Grove, the inventor of the battery called after him, a promulgator of the correlation of physical forces and a judge of the Queen's Bench, conclude a lecture at the Royal Institution with the quaint words: "Nothing is new, and nothing is true, and it doesn't matter"; it caused amusement and maybe gratified an epigrammatic impulse, and no one took him very seriously. But here was something which was new, and was true, and did indeed matter, even to the issues of life and death, and yet was ignored by Lister's colleagues and flouted by

his countrymen, who had to be converted years later from Germany and America by those foreigners who sat in the charmed circle, and of whom we students had a rather qualified opinion; they got in our way, surrounded the beds and engrossed the Professor's attention; but we were proud of them all the same, for other professors had no foreigners, and this ministered to our pride, atoned for the inconveniences and reconciled us to their presence.

The lectures were given twice a week and the theatre was crowded; very few of the men ever missed them, and it was to their credit, as Lister was not a "pass" man's lecturer, neither was his style easy or attractive.

Even in those days we were a much examined folk. The medical curriculum could be compassed within four years, and for those who had been at other medical schools it could be compressed into two. The majority of the men could not spend more time or money than was absolutely necessary and were consequently always in the grip of some exam. But Lister did not teach for examinations, they did not enter into his scheme, and he declined to be fettered by them.

Examiners wanted facts, but he sought to instil principles. The popular lecturer grouped his facts into heads which could be remembered and passed on parrot-like to the examiner; but Lister knew this was artificial and unscientific and that each case was a new problem, and that the only chance of becoming a sound practitioner was to lay a foundation of principles, which was slow work; one case thoroughly studied would be a guide to many others. It was the philosophic view of the case that appealed to him and he wanted it to concern us also. How Nature had been deranged, and how

the wise old Doctor was working to put things straight, and how could we but understand her we might help. The treatment of symptoms was all very well, but what did the symptoms mean?

He was a true disciple of Sydenham, the English Hippocrates, who two hundred years before had written: "A disease how prejudicial so ever its causes may be to the body is no more than a vigorous effort of Nature to throw off the morbific matter and thus recover the patient."

But such matters did not appear upon an examination paper, and it was obvious that from that standpoint we were largely wasting our time. Yet such was the magnetism of his personality and the contagion of his example that few of his class ever missed a lecture; in the interest he awakened we forgot the examination and lost ourselves in the problems of the case.

He was the greatest teacher I have known, and I use the words in their truest meaning: our curiosity was aroused, our mental appetite stimulated, and we were led on from point to point; we were educated, "led out," and taught to use and cultivate our senses, to prospect, observe and draw our own conclusions from what *we* found and from what *we* saw; knowledge was to be deduced rather than received. Of pre-digested food there was little, it was hunting all the time with nose to the ground, then intellectual mastication and mental digestion; he aroused in us cerebral hunger. Every symptom was a message "could we observingly distil it out," every deviation a suggestion; disease was vocal in silence, everything meant so much more than it seemed; the tangle must be unravelled, the jumble assorted, the hieroglyphics translated; the art of medicine

was no mere rule-of-thumb matter, every case was a problem, and the interests of the patient as sacred as though they were our own.

He had no natural gift of expression, and I am sure disliked public speaking and was haunted by the dread of the little stammer which never left him. His words were carefully chosen and deliberately uttered, and he rarely failed to make his point; he carried us along with him, and perhaps no teacher was ever better remembered. It was his earnestness that was his eloquence, and his concern for the patient his motive power.

These lectures were very solemn affairs; there was never a witticism or light moment; the burden of the matter hung upon him like a cloud which sobered us into rapt attention. They were a strange contrast to other lectures; the quiet, order, and attention placed them in a class by themselves.

Medical students in those days were fuller of animal spirits which at times boisterously overflowed; they loved to indulge in meaningless applause, and some of the professors had little control over the men. Occasionally a lecturer would lose his temper and leave the class; but the fiasco was ere long repeated and had a way of culminating at periodic intervals.

There was no meaning in it and it depended in some mysterious way upon the personality of the lecturer. Men of character commanded audience, but the weaklings succumbed, especially those who did not take the bull by the horns at the opening of the session. Naturally they were more in evidence in the junior courses, but even in the senior they never quite disappeared.

Some curious and amusing incidents occurred and I could say much upon the subject, but I only mention it

to show the contrast to the way in which Lister was treated. A pin-drop could be heard in his presence; he riveted attention and cast a spell of seriousness and earnestness over all. Once and once only was it broken.

The Professor had entered the theatre in his usual thoughtful and solemn manner, followed by the clerk who was carrying the spray. Chatter immediately ceased and dead silence ensued, when suddenly from the top of the theatre, in sonorous and clerical tones, a voice was heard: "Let us s-pray!" Every one appreciated the humour but we were too staggered even to smile. Slowly Lister raised his eyes to the speaker with sad and pitying glance without uttering a word! The effect was magical, the most oppressive silence followed and work was resumed. A year later the man died of general paralysis; we knew nothing then of spirochetes and it was playfully suggested Jove had smitten him for the sacrilege!

The entrance of Lister into the theatre is a memory that cannot be forgotten: his impressive presence and arresting personality, his anxious, thoughtful, and beneficent face lit up by his sweetly observant and commanding eyes, which worked with his mobile lips in revealing thought as his mind evolved action.

Four satellites accompanied him: the house surgeon, apprehensive and fidgety lest any dresser or clerk should fail in duty; the instrument clerk, carrying the tray on which were arranged the instruments, always scrupulously covered with a towel—or woe betide him; the clerk with the spray, fearful lest a full head of steam should not be immediately available, twiddling about with the spirit-lamp to make sure he was getting the best out of

it; and the chloroform clerk, with his bottles and towel, and tongue-forceps dangling from his coat-lappet.

After a kindly smile of greeting to his audience the Professor seated himself on the old worn horsehair-covered chair which had served as the chair of clinical surgery for generations and must have been a museum of microbes, cast a towel over his left knee, heaved the accustomed little sigh and began his lecture.

In front of him stood the operating table, a plain kitchen table devoid of all accessories, upon an old wooden floor frayed with wear and stained with years of blood, upon which were sprinkled a few handfuls of sawdust; at the side of the window was a large leaden sink, but there were no basins or other provision for the washing of hands, nor do I ever remember any such washing taking place before commencing an operation; there was no removal of coats and only an occasional turning up of sleeves; everything was ordinarily dirty and from our modern standpoint unthinkable. Yet it was under such circumstances that antiseptic surgery won its triumphs, and well might Lister in his later days regard as extravagant many of the refinements that architects and instrument-makers had lavished upon the modern operating theatre; of course, they were all to the good, but he questioned whether hospital committees were obtaining value for their money, and feared lest the meticulous care for the outside of the platter might not lead to disregard of matters that were far more essential. Antiseptics could never have gained a footing but for the potency of carbolic acid; small wonder, then, that Lister never discarded his old ally or forsook the bridge that had carried him over the surging tides of ubiquitous sepsis.

I dwell upon these details because the modern mind cannot otherwise realise the conditions with which early antiseptics contended; a school-child of to-day knows more of the value of ordinary cleanliness than did the savants of the past.

A large blackboard filled the space under the window, and on this Lister would draw. He was not a skilful draftsman, but his diagrams were to the point and helped us to understand the matter.

The method of clinical teaching was distinctive and unusual; it originated with Professor Syme, who had started a surgical hospital of his own at Minto House in 1829; it consisted in bringing the patients from the ward into the theatre, where the students were conveniently seated for seeing and taking notes. Lister had an unbounded reverence for his old master, and followed the method he had initiated.

One would have thought it would have been too trying an ordeal for a patient to find himself suddenly confronted with six hundred eyes, but they seemed to like it; they were never resentful and rarely seemed nervous. On the contrary, they appeared to appreciate the attention they were receiving, and that so many "doctors" were interested in and concerned with their case.

The patient was brought in by the dressers; there were never any nurses in the theatre much less a "theatre sister." They underwent no special treatment, neither washing nor scrubbing of the part, and were clad in their ordinary garments; the severer cases were carried on a stretcher by the dressers.

They were invariably greeted by the Professor with his sweet and assuring smile; he would hand them to a

chair or assist them to get on to the table. The magic of that smile allayed all fear, and in its sunshine they felt the moment of their deliverance was near; his presence and kindly attention filled them with comfort and hope, and they knew that all that was humanly possible would be done for them.

A description of the case followed and its special points were elucidated; then one or two of the distinguished foreigners who were generally present were invited to examine the part. Every stage of the investigation was conducted with the utmost regard for the patient's feelings: technical terms only were used, and nothing was said or suggested that could in any way cause them anxiety or alarm.

If the case was not for operation the patient retired and the lecture followed, emphasising as a rule the *principles* rather than the *details* of practice, a method which, ever since the days of Cullen, had been a prominent feature of the Edinburgh School, and was entirely in accordance with Lister's notions; for though he was an excellent anatomist, having been carefully trained under Ellis of University College, one of the foremost anatomists of his day, yet surgery wore to him a physiological rather than a purely anatomical aspect which, with the notable exception of John Hunter, he thought had not been sufficiently heeded and which he believed was a key to many of its problems. His early work had been upon the blood and inflammation, in which he had won his spurs by establishing their rôle, the one as the healer and the other as the defender of violated Nature.

He never tired of elucidating the physiology of the blood, its cupping and buffing, its clotting and fibrin,

and its serum, those wonderful processes for stopping the bleeding, providing a dressing and cleansing and closing the wound.

Hydrocele fluid also had a fascination for him and he saved every drop he could obtain; it was a treasury of secrets of far-reaching importance; but his enthusiasm for it failed to infect the class, as we never seemed fully to understand what it was meant to disclose; at least I speak for myself.

It seems strange as one looks back at the darkness that enveloped us, that nothing was then known of the meaning or composition of pus; it was conjectured to be dead white corpuscles, but this was only a bow at a venture. We had not the faintest idea that we were viewing the hecatomb of warriors who had yielded their lives to the microbic invaders; it was years later ere Ogston of Aberdeen discovered the coccus. Pus was not even thought to be contagious, a truth that was only slowly revealed by the suppuration of opposing skin surfaces. We knew but one thing, that if carbolic acid had a fair start pus was a declining quantity.

A few microbes only were known and their names could be counted on one's fingers; but Pasteur had discovered that putrefaction was caused by living organisms, and *Lister had drawn the great induction that surgical fevers were due to the same cause.* Carbolic acid arrested putrefaction in Glasgow sewage, and Lister applied it to wounds with equally happy results; this was all we knew, we were working through a tunnel and it was long before we came into the day. Fifteen years later it became an aphorism that "Lister had abolished pus!" and what greater tribute could adorn his name?

Another theme he never tired of enforcing was the

ceaseless contraction of scar tissue; day by day he would point it out, its beneficent action in closing a wound, but the necessity of controlling its action when it passed the limits of desirable function; an invaluable servant but a tyrannical master, he welcomed its help but curbed its excesses.

After antiseptics the subject that occupied his mind was the search for a satisfactory ligature. Silk had been the old material, unsterilised of course, and suppuration arose around it and the ligatures in time came away. Silver wire was next tried, which was less irritating and less septic, but being a foreign body had subsequently to be removed. Lister's ideal was to find a material that would settle down in the tissues and become organised in the wound, and his thoughts turned to some animal substance that having been living structure would be no foreign body, but would become organised in the scar whilst all the while it would keep its hold upon the tissues.

Tendon occurred to him as a likely material, and kangaroo tendon in particular; why kangaroo we did not know, except that it was longer than that of other animals. It was split into threads of various sizes and kept in 1 in 20 carbolic acid until it was wanted, and was used for ligatures and sutures in the ordinary way.

Lister tried it first upon a horse and ligatured its carotid artery under antiseptic precautions. The wound healed kindly, and the horse dying some weeks later of old age, he had an opportunity of examining the part, and found to his joy the ligature had become organised in the tissues.

A new era dawned for surgery!

Had it not been for antiseptics the experiment would

have failed, as septic tendon would have fared no better than septic silk; but the tissues extended a welcome to their kin so long as it was unaccompanied by hostile microbes.

Kangaroo tendon did not long survive, it was difficult to obtain, and something more accessible must be found, and his choice fell upon catgut.

He spent much time in discussing and explaining the preparation of the ligatures, detailing his experiments and describing his failures. The difficulty was the sterilisation, as catgut was resistant and compact, and here the penetrating power of carbolic acid was particularly useful. Another difficulty was the right degree of hardening to be obtained, which if too little, rendered the ligature liable to slip, and if too much, brittle and difficult to work.

Numerous strengths of chromic acid for hardening were tried, a long and tedious process, as it always seemed that each might be bettered.

Those who now buy their catgut ligatures nicely wound on glass reels have little idea of the time and thought that Lister spent upon it.

Fortunately he was a good chemist, as chemistry went in those days; he had been carefully trained under Thomas Graham of "colloidal" fame, and his acquaintance with many of the then out-of-the-way chemicals contributed in a large measure to his success, as without it he would never have succeeded in finding reagents with which to work.

Surgery was in those days regarded as the special child of anatomy, and but distantly related to physiology, and hardly at all connected with chemistry, which was relegated to the prescribing and dispensing of drugs.

The ordinary student learnt enough to pass his examinations and thereafter dropped the subject.

But with Lister surgery had a physiological side too, and in a deeper sense a chemical one also, for was not everything the outcome of the order or disorder of that great and unfathomable chemical laboratory, the body? Had he concerned himself with chirurgery only, he would never have bestowed upon the world the New Surgery.

The only humorous incident I remember in connection with him is the following. Seated in the shabby old chair, his face grave and serious, his head slowly bending to the side, the deep breath solemnly taken, the crowded theatre all expectant, he began his lecture in a low but most impressive voice: "Gentlemen. . . . Catgut is not cat's gut but sheep's gut." Doubtless it was news to most, but the bathos seemed profound. Such a man, such a solemnity, such an impressive utterance, and such an anti-climax! It has always struck me as very comical.

A description of its preparation followed, and of the difficulties of sterilising it, taken as it was from a welter of fæces, and he told us of his many visits to the slaughter-houses and how he had studied its manufacture from start to finish; he seemed to have struck up a kind of acquaintanceship with the men. Doubtless they were surprised that a professor from the University should take such an interest in their unsavoury business, but I have no doubt they were proportionately flattered; they could not have been otherwise as the fine silk hat, frock-coat, and stately figure mingled with their gruesome labours. But success, as he was always telling us, depended upon attention to detail, and nothing was unseemly if it helped the sick.

Of course, the newly enunciated germ theory of disease was often discussed, and Pasteur's work described and explained, and objections to its acceptance met and answered. But he was not polemical; his method was to demonstrate truth rather than denounce error; darkness could not be dispelled by invective, it faded only before light.

Everything depended upon whether organisms arose *de novo*, or whether they were the offspring of pre-existing life. If the former, antiseptics lost most if not all of their meaning, as organisms could arise spontaneously in the tissues; but if the latter, a host of objections had to be met. Little was known of their life-history and still less of their resistant spores, but one thing was certain, carbolic acid could deal with noxious intruders, and if there were others, even if they were "de novo-ites," they did not matter so far as the surgeon was concerned.

Strange to say, we never saw a microscope during the course, nor did we ever see Lister use one; there was one in the house-surgeon's room under a bell-glass, but we never saw him use it; and as there were then no aniline dyes he would not have seen much if he had. Bacteriology did not exist; there were no lectures upon it and no allusion to bacteria even in the botanical course; and apart from what we heard from Lister, the subject was never mentioned. A few names came up for reference, bacterium termo with a very wide connotation, the lactic acid bacillus, the buteric, and the organism of blue pus, and these comprised our flora.

Lister certainly used his big Powell and Lealand microscope, and had a high opinion both of the instrument and its maker; but the microscope as a working tool did not exist, and occupied much the same position

then as the elaborate instruments of electrical research do with the medical student of to-day; we never saw the foes we were trying to fight, all we learnt were their naked eye consequences.

Hughes Bennett, then, alas, just dead, had brought it into use in clinical medicine, urinary deposits, fungi of skin troubles, ova of tape-worms and the like, but it had not reached the surgical wards.

Oil-immersion objectives were unknown. Amici had suggested them in 1850, and Wenham had revived the idea in 1870; but it was not till Abbe got to work in 1874 that anything definitely was done, and not till 1885 that Powell and Lealand brought the homogeneous system into English use. The teeming world of microbic life was unguessed at but by the very few, and ignored and ridiculed by the many; a fierce controversy was raging over biogenesis and abiogenesis; Pasteur, Lister, and Huxley on the one side, and Bastian and the "common-sense" people (always positive and generally wrong) on the other, and was only decided by Tyndall some years later by his classical experiments upon dust and air-borne organisms at the Royal Institution. We were treading new paths, guided only by the light of scientific imagination, which has been the guiding star of explorers in all ages, and the establishment of antiseptic surgery was no exception to the rule.

No member of the class could have written half a dozen lines upon any or every microbe; their form, structure, and life-histories were to us unknown; all we knew was that a pestilence walked in darkness and that it could be averted by certain chemical solutions.

We were reared on simple diet; it was all that the household could provide, but it was brain-building all

the same, and about as much as our minds could then assimilate, the whole subject being so new. Let us vary the simile; we had our sheet-anchors to which we were moored, and though we swayed and swung in the tides of conflicting opinion, they did not drag and we rode secure.

Three flasks of aged urine, the most precious of the Professor's possessions, as sacred to him as the Three Hairs of Buddha are to the faithful Asiatic, he had had them for years, and he told me later, when he was appointed Professor of Surgery at King's College, of the concern and anxiety he had endured in transporting them to London, and how he and Mrs. Lister carried them upon their knees all the way in a specially reserved first-class carriage to obviate as far as possible any evil that might befall them.

They would be brought down to lecture and placed on a tray in the middle of the theatre. They were, I have since thought, a repetition of Pasteur's experiment of 1860, which was possibly a repetition of Joblot's experiment in 1711; they were one of Lister's earliest experiments and were undertaken to disprove the belief that putrefaction was caused by the action of the air.

Two glass flasks were half-filled with urine; the mouth of one was left open and the mouth of the other was lightly plugged with cotton wool. They were then thoroughly boiled and put aside.

In a few days the open flask was turbid and putrid, but the one which was plugged with cotton wool was clear and perfectly "sweet."

Evidently *something* besides air had entered the open one, and owing to the varying temperatures, and the consequent expansion and contraction of the air in the

plugged flask, there had been the entrance and exit of air also, but a *something* had been filtered out as it passed through the fibres of the cotton wool.

A third flask was then half-filled with urine as before and corked, but through the cork was passed a glass tube about two feet long which was bent horizontally, and waved up and down in four or five bends, and the end left open. It was boiled like the others, and though air could pass in and out it remained as clear and as sweet as the one that was plugged with the cotton wool.

The conclusion was evident, a something "particulate" was caught on the sides of the tube and the open filter was as potent as the wool. The cause of putrefaction was therefore a something *in* the air and not the air itself.

This was an enormous advance with far-reaching consequences both for theory and practice, and led to the invention of the spray, where everything about the wound, the hands and often the face of the surgeon and his assistants, were bathed in a cloud of carbolic acid; and it did yeomen's service, as then all concerned worked in their ordinary coats and the washing of hands was unpractised unless they were obviously soiled, and often they did not get even as far as that.

Years later the spray was discarded, but in those early days it covered a multitude of unknown transgressions, and we could not possibly have done without it.

Apparently the flasks never enjoyed the privilege of a second boiling to catch any later-hatched organisms; maybe urine does not contain them; but anyhow they never putrefied and that was enough for us, and they remained a standing demonstration that putrefaction was "particulate" and not "gaseous."

There were no books upon the subject apart from Pasteur's writings, which were inaccessible even if we had had the wish or the time to read them; all we knew about the matter we learnt from the Professor's lips.

Lister never recommended any books. Syme had published a small volume on clinical surgery in 1861 for the use of the class, but we never saw it; and apart from occasional references to what he had learnt from his old London teachers, Sharpey, Wharton Jones, and Liston, he rarely referred to any authorities with the solitary exception of John Hunter, for whom he had a boundless reverence.

To most of us Hunter is only known through his matchless museum at the College of Surgeons in London; but Lister was a student of his works, and the only book I ever saw him handle was an old and worn folio of his writings.

Syme and Hunter exercised a profound influence upon his mind: Syme for practice and technique, and Hunter the inspirer of surgical thought, whose love of experiment, passion for investigation and research in comparative methods appealed to him with fascinating force; they trod the same paths and their minds were cast in the same mould; a profound reverence for Nature's "practice," and a consuming desire to understand the wherefore of her methods, believing that through her mysteries there prevailed a survival motive, "a soul of good in things evil, could men observingly distil it out." Truly she sometimes killed her patients in attempting to cure them, but with a method all the same, which could it be unravelled, was pregnant with meaning and suggestion.

Little surprise need, therefore, he felt that Lister

was a convinced vivisectionist; he knew that only by studying the working machine could its methods be revealed. His kind heart shrank with aversion from the infliction of unnecessary pain, and he was as careful of the feelings of the brute as he was of the feelings of the man: it was only necessity that drove him to the task.

He would often say: "How much better is a man than a sheep"; and that "If we have the right to kill an animal for food we surely have the greater right to inflict a lesser penalty in the interests of humanity."

But he was merciless in the condemnation of sport. To kill a creature for pleasure or the pride of skill was to him intolerable, and he would say: "There is more cruelty in one afternoon of My Lord So-and-So's shooting than there is in the vivisection of this country in a whole year, and that for the number of birds which are killed probably an equal number get away to drag out an awful existence with compound comminated fractures in hedge bottoms, gnawed to death by stoats and suffering horrible misery."

He constantly declared that without the investigation of living structure the advance of the healing art was seriously hampered, and often impossible, and he deplored the limits which Acts of Parliament had placed upon it, passed by those who knew nothing of the subject, who strained at gnats and swallowed camels, who hindered scientists who were working for the alleviation of suffering but ignored the reckless cruelty of their own sports, who disregarded the miseries of birds but were indignant at the inoculation of mice, and he feared lest research might be driven from this country, and that the land that had discovered the circulation of

the blood might come to occupy a subsidiary position in scientific progress amongst the less hampered nations of the globe. Yet he whom vapid sentimentalists might brand as vivisector and bespatter with opprobium did not forget to place tins of water upon the leads of his house for thirsty summer sparrows.

I fear he had not a high opinion of some of his brother professionals. A case would appear which had been ignorantly or carelessly treated, and Lister did not gloss the matter; he would look very grave, sigh, and deplore the lack of skill or necessary care. He often regretted the modicum of acquirement with which some of the licensing bodies were satisfied.

Medical etiquette is at times a difficult and perplexing subject, its aspects and principles appeal so differently to different minds. Mrs. Gamp discussed the subject with Mr. Pecksniff: "It is not an easy matter to live, particular when your feelings works upon you. You may have rules and regulations of your own which cannot be broke through, some people may be Rooshans and some may be Prooshans; they are born so and will please themselves. Them which is of other naturs thinks different."

"Natur" drove Lister to side with the patient, whose interests he considered paramount. "What would you wish were you in his place?" This was the touchstone that revealed the metal! Other standards might be politic, expedient, or sagacious, but they did not help the sick, and degraded those who dishonoured the trust the weak and the suffering reposed in them.

He had little love for young surgeons, and would say how eager they often were to use the knife before they had given Nature her full chance, and when by time and

rest and care he succeeded in saving a limb he would say: "Had this poor child fallen into the hands of some young surgeons amputation might have been performed and a useful limb would have been sacrificed."

On a rare occasion when he rose to indignation it was over an unnecessary alteration a fledgeling had made in Syme's well-known abscess knife, and he spoke in no measured terms of the impudence and temerity of a parvenu tampering with the matured design of a master.

Strange as it may seem few of the world's greatest teachers have been writers; the men who have chiefly influenced thought owe the spread of their principles to the enthusiasm of their disciples: Thales, Socrates, Pythagoras, Gautama Buddha, and Jesus never wrote a line, and no text-book or treatise upon antiseptics appeared from Lister's pen. A few lectures in the medical journals appeared from time to time, but we neither knew of them nor read them; he never referred to them, and we learnt nothing of the revolution from the printed page.

Considering how dependent the student is upon his books it makes it more remarkable, and how, regarding the novelty and the difficulty of the subject, we ever got a glimpse of the matter is a wonder; it was due entirely to the personality of Lister; his power of arousing interest, riveting attention, and awakening enthusiasm. After his death, when I saw the three large volumes of his Collected Papers, I was astonished; but in the form in which they were originally published they were inaccessible to and quite unknown to his class.

Some years later he published two or three lectures in the medical journals on the recent developments of antiseptic surgery, and these were the only writings of

his I ever read or had the chance of reading; we were entirely dependent upon his teaching and what we learnt from him at the hospital.

The visiting foreigners spread the gospel in their own lands, and his pupils carried it to the provinces and the colonies.

It was years before it could be learnt from any book, and some of the early attempts were strangely apocryphal. I doubt if the many who now work by his rule have ever read his writings.

Most of the healers who live at all live through their books, but Lister must be classed with the greatest who live through the influence of their work and teaching.

He had a passion for conservative surgery, and was never so happy as when he could repair or save a threatened structure. Of course antiseptics made much of this possible which otherwise would have been hopeless.

Every particle that could be kept was brought into use and especially skin and periosteum. Nothing was unimportant: the position of a limb to promote its blood current; the avoidance of strain and muscular tension which might divert nervous energy or deprive the patient of a good night's rest; the filling of a cavity with a blood clot that might be coaxed to organise; the grafting of skin, then a novel procedure; and the promotion of comfort by the careful arrangement of pillows and sand-bags were matters of ceaseless care and pleasure.

After a dressing was finished he would turn to the patient with his charming smile, and ask: "Now are you quite comfortable?" Nothing was trivial and nothing was insignificant, the accumulation of small advantages was always in his mind; like a good chess

player he was as careful of his pawns as he was of his pieces.

He finished the dressings himself and also the bandaging, arranged the pillows tidily and comfortably; neatly and smoothly turned down the bed-clothes; and then came the final act, the parting smile which ministered to the emotions and engendered hope—there is no tonic like hope—and the patient felt that his was no mere "case," but the personal and intimate concern of the great and kind Professor.

His devotion to plastic surgery was intense. Skin-grafting before his discoveries was doomed only too often to failure through septic invasion; but antiseptics gave it a new chance and Nature a new environment in which to work, and Lister did a great deal of skin-grafting both of the large and small kinds, and delighted to see the tender stars of light blue epithelium emerge after their temporary disappearance. The restoration of the damaged face was to him particularly pleasing, as it added much to the patient's happiness and gratified his own sense of æsthetic achievement.

Mr. Syme had devised an operation for restoring the lower lip, and Lister would take a piece of lint, cut a hole for the mouth, and then show how by well-planned incisions and deep sutures the parts could be brought together. I have one of these patterns in my possession.

He had, as I have said, a poor opinion of examinations, and felt that the work, and such work, should be done for its own sake, and that to study merely to pass an examination and to be satisfied with the modicum of knowledge required was to debase the noblest of callings. The work was so pre-eminent, the delight of healing so entrancing, and the benefit conferred so overwhelming, that to

measure one's fitness by a minimum acquirement, to cram the mind with rule-of-thumb technicalities culled from artful coaches primed with wily anticipations of likely questions, was to degrade the noblest profession, and prostitute opportunity for the most unworthy issues.

"Naturally," he would say, "you must pass your examinations, but if you are in any sense worthy of your calling you will aim far higher than that, and when you have surmounted these necessary barriers you must never forget that you have had but a very limited training, and that the real part of your studentship has but begun; you have had an insight into the immensity of the subject and of its extraordinary difficulties, and must seize every opportunity for extending your knowledge. You must always be students, learning and unlearning to your life's end, and if, gentlemen, you are not prepared to follow your profession in this spirit, I implore you to leave its ranks and betake yourselves to some third-class trade."

We heard it again and again, how noble was our calling, how little we knew of its mysteries, the immensity of the subject, its transcendent issues, the helplessness of the sick, the trust they reposed in us, and our obligation to devote all our powers to the life we had chosen.

In 1875 he delivered the Graduation Address, and I remember the elation with which I entered the hall, that at last the badge of academic fitness was to be conferred upon one—but I left it with different feelings!

As he finished he warned us in solemn and momentous terms of the limits of our knowledge and of the responsibility of the work that lay before us; that it was "our proud office to tend the fleshly tabernacle

of the immortal spirit," and only by persistent devotion and continued study could we fit ourselves for its efficient discharge, and he closed with a most disconcerting simile.

He reminded us of the Ancient Britons whose chariot wheels were armed with knives at their axles, and who drove about spreading death and destruction around them! I could only surmise he was thinking of us young practitioners going our rounds, and fervently hoped that my mother was too far from the orator to catch the meaning of the metaphor.

It was the custom of the graduates on the afternoon of the Capping Day to be photographed in their newly acquired academic garments, and little groups of friends made their arrangements.

I could not suppress a consciousness of our kinship to the Pharisees, "who made broad their phylacteries and enlarged the borders of their garments"; perhaps we, too, might soon "be full of dead men's bones" in a more real sense than the figure contemplated! Anyhow, Lister had done his best to "feelingly persuade us what we were," "Faithful are the wounds of a friend!"

It was his earnestness and sincerity that was so compelling; fancy a Regius Professor at the largest medical school in the kingdom, probably in the world, lecturing upon his mistakes! What a contrast to the general rule! Who is there who does not sometimes hide his errors or endeavour to divert them into other channels? But personal considerations did not seem to affect him; only one thing mattered: "This poor man; this poor woman," their plight and their relief!

He had learnt the rarely acquired habit of self-effacement and regarded himself but as the servant of the

sick. In the Graduation Address I have mentioned he quoted those noble lines from Milton's *Lycidas :*

> " Fame is no plant that grows on mortal soil,
> Nor in the glistering foil
> Set off to the world, nor in broad rumour lies,
> But lives and spreads aloft by those pure eyes
> And perfect witness of all-judging Jove ;
> As he pronounces lastly on each deed,
> Of so much fame in heaven expect thy meed."

And he concluded with these words : " If we had nothing but pecuniary rewards and worldly honours to look to, our profession would not be one to be desired. But in its practice you will find it to be attended with peculiar privileges ; second to none in intense interest and pure pleasures. It is our proud office to tend the fleshly tabernacle of the immortal spirit, and our path, if rightly followed, will be guided by unfettered truth and love unfeigned. In the pursuit of this noble and holy calling I wish you all God-speed."

But do not for a moment imagine, in spite of all that I have said, that there was anything of the " goody-goody " about him ; his words were few, confined to the subject before him, and he rarely dealt with side issues.

If ever he alluded to immorality it was to point out the disastrous consequences of moral disregard and the painful aftermath of its neglect ; he pitied the wrong-doer, but never upbraided him.

CHAPTER X

DESCRIPTION OF AN OPERATION

Even in the early days of 1874–75 we had far outdistanced the work of the best septic surgeons, but a comparison of the methods adopted with modern procedure will seem strange and almost bizarre, and it may be thought little less than remarkable that the results obtained were as uniform as they were.

Modern aseptic surgery is, it need scarcely be said, the child of the old antiseptic methods, and without the parent there could not have been the offspring.

The " entourage," to use a favourite word of Lister's, was in those days deplorable, but it demonstrated the great truth he was always enforcing, that it is " on the table " that the patient's fate is decided.

In later life he never tired of insisting that the surroundings of the operation were of far less importance than the proper performance of the operation itself; that asepsis was Utopian, and man being the fallible creature that he is, it was not in the patient's interest that he should risk a perfection which belongs to the ideal. Blondin might walk across the Thames on a tight-rope but he would be a foolish man who would try the venture; that nurses were scientifically ignorant of the foes they were fighting, and students and practitioners often unmindful of the ubiquitous nature of the germs

that beset us; that an antiseptic was, even under the most perfect conditions, not only desirable but really essential; and further, that aseptic surgery is only possible in specially equipped hospitals manned by trained staffs, and quite impossible in general practice far removed from sterilising plant and all the refinements of modern hospital equipment.

Nowadays asepsis has a wider reach, and measures exist for its extension that were undreamt-of in his day; but let not any one imagine that Lister ever discouraged or opposed aseptic measures; they were all to the good and could not be otherwise, but it is one thing to admire a movement and another to trust to it.

I fancy could he but see the most advanced surgeons of the most rigorous aseptic type painting the skin with iodine before making an incision, and taking their knife out of methylated spirit, a merry twinkle would play round his eyes and he would feel that antiseptics are still in fashion, and, though discountenanced, are still essential.

Although carbolic acid was his sheet anchor and the agent above all others on which he relied, he was fully aware of its deleterious action upon the tissues.

Any substance which could destroy the protoplasm of the microbe could not fail to be detrimental to the protoplasm of the tissues, and he was ever trying to adjust the balance so that whilst the aggressor was worsted the defender might suffer as little as possible. He freely admitted that antiseptics were in themselves an evil, and spent much time in trying milder substances such as thymol, salicylic acid, boracic acid, etc.

But I have wandered from the subject, the description of an operation, but the digression was caused by the

memory of the deplorable conditions under which his early triumphs were achieved; they were like the old roads of the Highlands of which a witty Irishman wrote:

> "And if you'd have seen them
> Before they were made,
> You'd have lifted your hands
> And blessed General Wade."

The operating theatre was grimed with the filth of decades; I suppose it was occasionally cleaned, but such process was never in evidence. There was but one window, the large one to the north, which lighted it, but it was never opened. The frayed old wooden floor was browny-red, telling its tale of the scenes it had witnessed. Many of the students came straight from the dissecting room. The operating table looked as though it was never washed and around its base sawdust was sprinkled.

No one dreamt of washing his hands before commencing work. I have seen dressers assisting who wore "mourning" beneath their nails. No one ever took off his coat; occasionally the professor would turn up his cuffs, but the assistants never; probably they would have considered it a breach of etiquette as assuming an unwarranted importance.

When one thinks of the modern operating theatre, with its impermeable walls and tesselated floor, the ritual of the officiating priests, their hand-washings, scrubbings, boiled rubber gloves, sterilised overalls and face-pieces, one marvels that early antiseptic surgery survived at all, but it was saved by carbolic; everything was soaked in 1 in 20, hands, instruments, and patients' skins; huge Winchester quarts of the precious fluid were

everywhere around, and it was Lister's delight to say again and again that carbolic acid penetrated grease, and its capacity was certainly tested to the uttermost, and it lived up to its reputation; we could not have done without it.

Moreover, the whole scene of an operation or dressing was enveloped in its spray, which dispersed its globules into every nook and cranny of the wound, and our faces and coat-sleeves often dripped with it.

Towels soaked in 1 in 20 figured largely in the scene, and were placed around the wound. I never remember them so used in London, but Lister never worked without them; he would pin them carefully with (carbolised) safety-pins around the part, leaving a window in which he worked; he was very fond of safety-pins.

The spray was devised to counter the idea that sepsis was largely due to air-borne organisms (*vide* Pasteur's "Memoirs on the Organised Corpuscles which exist in the Atmosphere," in the *Annales de Chimie et de Physique*, 1862), those organisms which we knew were arrested in the long waved glass tube of the boiled urine flask. Subsequent experience convinced Lister that they might be disregarded, but the truth dawned but slowly, and it was years before he learnt that "sepsis is a question of dosage," that the living tissues can deal with a few organisms but are overwhelmed by the many.

It was a relief to all when the spray was abandoned; it was costly and cumbersome and often at fault, besides being a waster of time when it failed. Old-time surgeons chuckled and said that Lister had abandoned antiseptics! But let no one despise the bridge that has carried them over, or lightly esteem the primitive devices of earlier days.

To most of my readers "the spray" will be an unintelligible quantity, so I will try and describe it.

A circular copper boiler, four inches in diameter and three inches in height, was mounted over a large spirit lamp; the nozzle from the boiler was led over a glass vessel in front, filled with a 1 in 20 watery solution of carbolic acid which the issuing steam drew up through two tubes and dispersed as a warm cloud of spray about two feet in diameter of 1 in 40 globulettes. A wooden handle was fixed at the back by which it was held and directed.

Lister had spent much thought upon its design, and every few months, in conjunction with some cunning workman, improvements were effected. As with the catgut people, so with the spray-makers, a sort of friendship seemed to have arisen between him and them, and he would speak in warm terms of the help he had derived from their suggestions.

A clerk—that is, a former dresser who had won promotion—was specially detailed for its care, and for half an hour before the Professor's visit he was getting it into working order; there was an endless trimming of the lamp, poking of wires down the nozzles, and testing the safety-valve on the boiler.

Two steam taps were always available lest one of them should fail, and woe betide the clerk if the spray did fail or gave out at an operation or dressing. Everything was immediately stopped and the wound was instantly covered with gauze soaked in 1 in 40, all eyes being trained upon the delinquent, and Lister sighing plaintively and scanning the attempts at rectification, and the distinguished foreigners gazing in perplexity at the interruption.

These were unpleasant moments for the clerk, but things will not always work smoothly and the spray was no exception to the rule; but as soon as the familiar hiss again prevailed a sigh of relief terminated the suspense and work was resumed.

Some years later the spray was, as I have said, discarded, but I hope specimens of our old friend have been preserved in the museums as fossils of the antiseptic record, for it played a great rôle in the evolution of the movement.

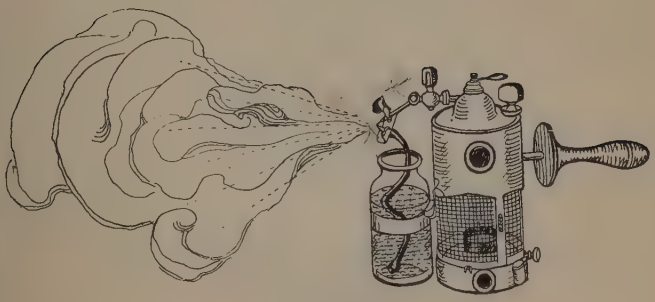
Another of the three clerks was the instrument clerk, and his duties, though less evident, were responsible; he had to think out the operation and bring down all the instruments that might be needed.

Operations were simpler in those days and the instruments were fewer, but he was accountable for the ligatures, the catgut in particular, and his work was anxious and exacting.

Woe betide him also if the knives had not a perfect edge, as Lister tried each upon the palm of his hand before he used it, and if it failed to pass the test it was solemnly and ominously returned, his rule being that every knife after use must at once be sent to the instrument-maker for resetting.

He had a horror of a dull knife which, he said, bruised the tissues and so retarded healing. I shall have more to say later upon this knife matter and to relate a dramatic incident that occurred in the wards.

The instrument clerk was responsible also for the sponges—the modern sterilised cotton swab was unknown—they were small Turkey sponges which were kept in large glass jars in 1 in 20. After use they were thoroughly washed and purposely placed in



THE SPRAY

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ordinary water for three weeks to putrefy in order to disintegrate any blood clot that remained in their tissues, after which they were washed in soap and water, and placed in 1 in 20 until required.

Lister used to smile and say he was getting a turn out of the microbes, getting some legitimate work out of them, and setting them to clean his sponges rather than destroy his patients.

Needless to say carbolic acid made sad work with our hands, which were always rough and cracked; but Lister rather prided himself upon this, and would smilingly say he could recognise his friends when he shook hands with them as he knew them by their "antiseptic hand." It was thirty years later before boiled rubber gloves came into use, and considering the nidus these rough and cracked hands were for infection, it is wonderful that things went as well as they did; but here again the faithful carbolic was prevailing.

One day the instrument clerk so far forgot himself that he brought the instrument tray into the theatre—*uncovered!*

Lister at once detected it and instantly threw a towel over the tray, and turning to the clerk said in slow and sorrowful tones: "How can you have such cruel disregard for this poor woman's feelings? Is it not enough for her to be passing through this ordeal without adding unnecessarily to her sufferings by displaying this array of naked steel? Really, Mr. ——, I am surprised at you."

It did not happen again!

The third clerk administered the chloroform. It was strange to me to see the anæsthetic entrusted to a student, as in London it was only given by a qualified man; but

here it was given by a third-year's student, and very well given too, for I never saw or heard of a mishap.

Lister was a specialist on chloroform. He was present at the first operation ever performed under ether by Liston, in 1846, and had devoted a great deal of attention to it, and written the article upon anæsthetics in Holme's *System of Surgery*, the authoritative work of the day. He never, however, referred to it; but we knew of its existence, though none of us, I am sure, had ever read it.

For our purposes the subject was condensed into a few rules, which he reiterated from day to day, and he held tenaciously that if they were observed the anæsthetic could be safely administered. Moreover, he considered it an essential part of our training without which we would be unfit for a work which would inevitably fall upon us.

He preferred chloroform to ether; its action was quicker, its anæsthesia deeper, and it was not inflammable. Nitrous oxide as an adjuvant was then unknown. He was perfectly satisfied with chloroform and would say he wished for nothing better. "Use only the best chloroform and give plenty of it. No methylated chloroform or any of secondary quality."

"Give it upon a folded towel formed into a rough cone; pour into it a couple of drachms to begin with and keep it a fair distance away from the patient's face. Begin gradually, and go on slowly; quietly and gently put the patient to sleep. Should any sign of resentment occur, or should he hold his breath, the dose is too strong; withdraw the towel, wait a few seconds and quietly begin again."

"Should struggling ensue desist at once; this is

where danger happens. Wait until all is quiet and gradually start again. A patient holding his breath will suddenly take a deep breath and so may get a fatal dose. Never continue the administration unless the breathing is perfectly quiet and easy; never hurry or push the chloroform, the obtaining of a gradual unconsciousness passing into a quiet sleep is what is to be aimed at. Hold the third and fourth fingers of the hands under the cone of the towel, and be sure and allow plenty of air between it and the face."

"Turn the patient's head over to the side, this will prevent the tongue slipping back and obstructing the larynx; tilt the chin forward with the fore-fingers; stand behind the head so that you have full control of the patient and be able to work comfortably."

"Never feel the pulse during the process; *it is the breathing not the pulse that matters.*"

Often and often he would take the patient's arm away from the clerk's finger and place it out of his reach.

"The respiratory centres are paralysed before the cardiac"; this was the essential point and he had arrived at this conclusion after long research.

"Watch the breathing and so long as that is normal all is well; stertorous breathing is not normal breathing, therefore withdraw the towel and wait till natural breathing supervenes.

"Should the breathing stop, the tongue has probably slipped back and is blocking the passage; pull the chin forcibly forward and draw out the tongue with the tongue-forceps (but this accident may generally be avoided by keeping the head over to the side). Should this fail artificial respiration must be resorted to." But I never knew it to be required, nor did I ever see

the heart auscultated before an administration, for Lister firmly believed that if the patient was well enough to be operated upon he was well enough to take the chloroform.

He preferred an ordinary towel for the chloroform. The fashionable apparatus of the day was Clover's bag, which was slung over the anæsthetist's shoulders; but Lister distrusted all such mechanisms, which might easily go wrong and lead to disaster; a towel had neither pipes, valves, nor anything that could get out of order and was always available.

These were Lister's anæsthetic rules and principles, and they worked faultlessly. Not only did I never see a death, but I do not remember a really anxious incident, and never saw an artificial respiration resorted to; and guided by them, I have given chloroform hundreds of times and never lost a patient. But these, I fear, are not the accepted methods even of the present day, and it is a melancholy fact that deaths under anæsthetics are still occurring.

Years later there was a Hydrabad Commission under Sir Lauder Brunton, and the correctness of the principles was confirmed, that the breathing ceases before the heart, but prejudice dies hard. I have heard it said there was a something in Scotch air that was favourable to chloroform; more truly, I think, it might be attributed to a something in Scotch methods!

Another point in favour of chloroform he insisted upon was that it encouraged bleeding, and so revealed small vessels that required tying and which otherwise might have escaped notice; and this was of the greatest importance, as healing by first intention can only occur when the surfaces are in apposition, and

any blood-clot, no matter how thin, makes this impossible.

The preparation of the skin at the seat of the operation was primitive; there were no elaborate washings and scrubbings, and nothing was done until the patient was on the table. The antiseptic properties of soap were unknown. As soon as the patient was fairly anæthetised the skin was soused in 1 in 20 carbolic acid lotion, which was well rubbed in, and as carbolic penetrated grease this was deemed sufficient. Strange to say, we were seldom troubled with stitch abscesses!

Great attention was paid to drainage. Two large glass jars with different sized rubber tubes were always at hand, and great care was taken in selecting suitable sizes and cutting them to the required lengths; they were never omitted from an operation wound and were left peeping out from the corners, the ends being bevelled to lie even with the skin, and thus avoid pressure which might block the end of the tube. At first they were threaded with silken tags, which were always a source of anxiety, as if they were too short the tube might slip out, and if too long they might become bridges for the conveyance of outside organisms. I well remember Lister's delight when it occurred to him that a safety-pin might answer all the purposes; he could select a suitable size, and it was easily sterilised. It was a small matter, but "success depends upon attention to detail."

There is no doubt his successes were furthered by the ceaseless attention he gave to little matters that were then unthought of, or regarded as of no moment. Everything resolved itself into small advantages, and after all, were not antiseptics themselves a question of very small things?

The pre-Listerian surgeon, so far as my experience went, concerned himself with the performance of the operation, and that being over, his interest flagged. The flaps were rapidly adjusted with rather distant sutures, the cavity filling with blood clot which would be disintegrated by putrefaction and swept away by subsequent streams of pus. Healing by first intention was hardly expected; a loose and open wound was obviously safer.

But antiseptics made all the difference. If sepsis was due to micro-organisms and if they could be excluded, healing by first intention was not only possible but the thing to be aimed at; to restore the tissues to a normal condition in which Nature, unhindered, could repair the breach. For this the accurate apposition of surfaces was essential, muscle to muscle, skin to skin, and anything which interfered with this must be obviated; there must be no separating blood-clots, so every bleeding point was ligatured with a catgut suture that could be absorbed and not become a foreign body; effused serum must be drained away by suitable tubes; cut muscles must be opposed by deep and efficient silver sutures that could be easily removed when no longer needed; skin flaps must be accurately adjusted. In a word, an operation wound, minus the part removed, must be restored as far as possible to its pre-operation conditions, rest for the mass and microscopic rest for the cells by the exclusion of all foreign organisms. Under such conditions healing by first intention was not only possible but expectedly probable, and as a matter of fact was generally attained; if it failed "some one had blundered," and details must be reviewed.

Yet, strange to say, these very niceties were used

as weapons against him, as his opponents were tireless in asserting that the successes he achieved were due rather to the careful attention he bestowed upon the wounds than to any truth in his theory of sepsis.

The deep silver sutures, which he called "stitches of relaxation," were fastened at both ends to flat leaden buttons an inch in diameter, or oblong plates of sheets of lead two inches by one inch, a good distance from the wound; they acted as splints and relieved the skin-flaps from tension, and with their help he was able to bring together widely separated surfaces.

He always applied the operation dressings himself; they were invariably ample and were swathed in sheets of antiseptic wool. A copious bandaging with gauze bandages followed, no regard being paid to the classical types so carefully taught and so prettily applied of the old stiff calico ones then in vogue.

In London we *could* bandage; it was an art that every dresser acquired. "Parallel and equidistant" was the rule for the encircling turns, the thing aimed at being "to walk upstairs" with the first two fingers upon the steps of a properly bandaged part. There were spicas and capitella, and many other types; whited sepulchres when one thinks of the microbes imprisoned beneath, but the finished product looked excellent, and dresser and patient were pleased.

With the flexible gauze bandage all this was disregarded. It was a "go as you please," straining the bandage where necessary or halting it with safety-pins when this was impossible, and starting again; but it was efficient and comfortable, and that was the only thing that mattered.

I wonder how many of the innumerable surgeons

who now use the soft bandage know that it is to Lister they are indebted for its introduction? It arose largely by accident from the necessity of having a carbolic gauze bandage to fix the dressing, and this came to be extended and soon superseded the hard, unpurified and unyielding calico.

No pains were spared to make the patient easy and comfortable. It was not "that will do," but it must be the best and most comfortable position attainable. How often have I heard him ask the patient: "Now, are you quite comfortable?" He insisted upon the absence of strain whether in the wound, the muscles, or the mind, and held it essential for rapid healing. Any discomfort radiating a disturbance and possibly depriving the patient of a good night's rest, "Sore Nature's bath."

To attain this, a plentiful supply of pillows and sand-bags of various sizes were always in readiness, and were fitted and arranged by the Professor himself. Should it be the leg, a favourite plan was to place it upon a large pillow, lightly secured by a couple of loops of bandages. It was "one of the many things" he had "learnt from Mr. Syme." It acted as a large well-padded splint, prevented movement during sleep, and was a buffer against unsuspected jogs.

A large wooden block, about fifteen inches long and six wide and deep, was slipped under the buttocks whilst bandaging was proceeding; it allowed of free and rapid play for the hands, and avoided the liftings and strainings each time the bandage was passed beneath the patient. Nowadays, a modern operating table can raise its centre!

As an operator Lister was neither showy nor rapid; he used to say that chloroform had abolished the necessity for speed, and gave time for careful and accurate work.

On one occasion, when the patient was arranged for lithotomy, he turned to the students and quietly said: "Gentlemen, Sir Astley Cooper could extract a stone in two minutes, Sir Henry Thompson could do it in eighty seconds, but I am going to take four or five minutes at least. And if I were the patient the last words I should say to the surgeon would be: 'Please do not hurry; please take plenty of time.'"

Any idea of making a record for personal glorification would have been to him abhorrent; the only question was: "What would you wish were you in this patient's place?"

I have not the least idea how many minutes were required, but the operation was successful, and the patient made an excellent recovery; and one cannot doubt but that the few extra minutes were well and wisely spent.

He had what physiologists could only rate as an ordinary personal equation; there was nothing brilliant about his operating, it was accurate, careful, and discreet.

I have seen dashing operators, limbs off, and tumours out in a trice. Naturally one admired their dexterity and they gained a reputation for being brilliant surgeons; but if operating is to be judged by its results he was in the very foremost rank, as his cases rarely failed, and almost invariably achieved the end he had in view.

Whenever he was more than usually earnest he would break out into a profuse perspiration. Great beads of sweat would collect upon his forehead and course down his face; it annoyed him, and he regarded it as an infirmity he could neither prevent nor control. He would pause in his work, give a plaintive little sigh, and turning to a dresser ask for a towel with which he would

mop his face, then turning to the class would speak of it pathetically as "the sweating sickness." In a few minutes the process had to be repeated. "He was stirred with such an agony he sweat extremely." The modern surgeon covers his face with a linen mask, but such refinements were unthought of, and the consequences might have been serious had it not been for the faithful spray; and what it missed was caught by the lotion which flooded the wound.

No trained hospital porter in brown holland overall with india-rubber tyred trolley waited to take the patient to the ward; the dressers formed up, placed the patient on a simple stretcher and carried him as best they could up the long flight of stairs; any serious case Lister invariably accompanied. Arrived in the ward he would direct the movements for lifting the patient, always insisting that the stretcher must be placed at the foot and not at the side of the bed, as seems one of the ineradicable errors of human nature. When three pairs of arms were under the body the word was given, Lister himself taking the head; he then arranged the sand-bags and hot-water bottles, accompanied by invariable warnings of the necessity of their being covered by flannel, and how patients recovering from anæsthesia had been burnt if this was omitted. Finally, with almost womanly care he would replace the bed-clothes, and see that all was snug and comfortable, and as soon as the patient articulated a word would say that all anæsthetic danger was over.

He bestowed as much care upon a peasant as he would have given to a prince.

CHAPTER XI

THE DEVELOPMENT OF ANTISEPTIC DRESSING

In an earlier chapter I have narrated how it happened that Lister became acquainted with carbolic acid. The Glasgow sewage tanks were creating a nuisance by the offensive odours they emitted, and it was found that by mixing a certain quantity of what was then known as "German creosote," a crude form of carbolic acid, the nuisance was abated. Lister had learnt from Pasteur's work that putrefaction was a ferment due to living organisms, and if these were killed putrefaction did not occur. I do not think he had any definite knowledge as to what exactly happened, or that the "killing" was due to the chemical action of the creosote upon the protoplasm of the microbe, rendering the machinery of its colloidal activities unworkable; his knowledge was empirical: no creosote, putrefaction; creosote, no putrefaction; and his first dressing was a carbolic putty, a mixture of German creosote and whitening, of creamy consistence, spread upon the wound and covered with a piece of tinfoil, the good effect of which was immediate; the compound fracture upon which it was tried healing under a scab with a complete absence of constitutional disturbance which was surprising. He saw at once a confirmation of his conjecture and was greatly encouraged. An examination of the German creosote disclosed the fact that

carbolic acid was its chief ingredient, and as this was soluble in water it could be applied as a lotion; the putty was therefore discarded. The tinfoil could also be bettered, as it was far from an ideal dressing since it retained the discharges instead of absorbing them.

His next idea was to try a gauze which would absorb the discharges, and this being saturated with carbolic acid destroyed organisms and was a great improvement; but the discharges washed away the carbolic, and unless the dressing was frequently changed putrefaction crept into the wound. Moreover, the drying discharges stiffened the gauze, which ceased to adapt itself to the wound and was uncomfortable to the patient.

The next step was to saturate the gauze with resin which held the carbolic better, and this was the familiar yellow "carbolic gauze," which held its place for years as the best antiseptic dressing. A large piece was taken and folded into eight layers, and wrung out in carbolic lotion to kill any germs that might be upon its surfaces; between the seventh and eighth layers a piece of thin mackintosh was inserted, and it was characteristic of Lister's care that he had this coloured pink in order that its presence might always be assured, as well as to indicate the side of the dressing which must be applied to the wound; as had the one layer of gauze been by mistake placed innermost the small amount of carbolic on duty would have entailed disaster. The dressing was large, overlapping the wound for several inches, and the invariable rule was followed that as soon as any discharge showed itself at the margin the dressing must at once be changed, or germs might find an undefended path to the wound.

Devoted as Lister was to carbolic he never failed to

regard it as an evil—a necessary evil, but an evil all the same—and fully realised its powers for ill: that it coagulated albumen, destroyed tissues, and irritated them even in weak solutions. His ideal was that carbolic acid should be put upon outpost duty and that the wound thus defended should be placed as far as possible under conditions in which Nature, unhindered, might carry on her marvellous processes of healing. All he aimed at was to give her fair play. He realised that carbolic acid was no part of her scheme, a foreign element she neither desired nor approved, which was able to guard the frontiers but ill-suited for home service.

It is important to emphasise this, as the idea was current that Lister considered that carbolic acid was in itself a healing agent, but such was furthest from his thoughts. He knew full well that Nature is the only healer, and that she had ceaselessly elaborated her methods, which in natural surroundings are generally successful; trees heal their wounds, crabs amputate their limbs and contact is satisfactorily restored. For countless ages she has been evolving a system of living antiseptics, the wealth and variety of which we are only now beginning to appreciate, and all we can do is to arrange better conditions in which she is able to carry on her work.

There are no such things as "healing ointments," a truth I learnt from Lister's lips; at best they do but minimise obstructions. Man has been concocting them for ages and taking credit for what our great mother has done—healing is from within.

The refutation of the heresy lay in the one word "protective." It was his own name, and sheds a flood of light upon the workings of his mind.

"Protective" was a strip of thin oiled silk coated with dextrine, and soaked in boric acid lotion before it was applied; it was laid upon the wound and snipped at its edges to ensure apposition. Boric acid was the mildest antiseptic he knew; the idea was to protect the wound from carbolic acid, to form an artificial skin, and to reduce antiseptic interference to a minimum. Here at the all-important place carbolic acid was as far as possible excluded.

In those days Lister was so sadly misunderstood that the idea became prevalent that he considered carbolic acid possessed a mystical charm over wounds. Only bring carbolic acid upon the scene, and pyæmia and septicæmia would vanish! One day he read to us a letter he had received from a surgeon expressing his disappointment that although carbolic lotion had been sprinkled upon the wound, and basins of it had been placed around the bed, and some had even been sprinkled upon the floor, yet the patient died! I recall his sad and sorrowful face; the accustomed sigh; the slight stammer that generally appeared under emotion, as with head inclined to the side he pathetically said: "Well, gentlemen, it is no new thing for me to be misunderstood; somehow or other I do not seem to have the power of expressing what I mean in language that is capable of conveying my meaning."

But this was the prevailing idea; London misread the message and was no exception to the rule; carbolic acid they knew, carbolic acid they tried, and carbolic acid they discarded; they thought it was Listerism; they did not understand the principles and could not visualise the foes. Micro-organisms were but myths "begot of nothing but vain fantasy," and what the eye

had not seen the heart did not grieve; their minuteness discounted their importance, and if they had an existence, what bearing could such insignificant things have upon one's daily work? For dilettantes they might be interesting, but for busy common-sense folk they could not have a meaning.

And so the smell of carbolic which pervaded hospitals in 1871, faded and passed in 1873; and a return was made to the old methods with the comfortable assurance that a fair trial had been given to the new treatment, and that like so many of its meretricious predecessors it had been weighed in the balances and found wanting.

Many of the leaders of the surgical world were not only unconvinced but were positively antagonistic; and well they might be, for rule-of-thumb practice, unintelligently applied, could only end in failure.

It was a long struggle and an uphill fight, and Lister might well have been discouraged, for London had rejected him; England had discarded him; and his own colleagues almost ignored him. One or two of the juniors were converted, but they only made the darkness more apparent. But he held on, lived to see the triumph, and to receive the homage and allegiance of a converted world.

"If thou canst plan a noble deed
And never flag till it succeed,
Though in the strife thy heart may bleed,
Whatever obstacle control,
Thine hour will come, go on, true soul,
Thou wilt win the prize, thou wilt reach the goal."

And yet how inevitable it was; for who could acquire the antiseptic art from a few scattered lectures reported in the medical journals? And this was all the

vast majority had to go upon; the whole affair was so novel. It was impossible for any one who had not followed Pasteur's work to realise that everything was coated with a dust of living organisms, and that should the surgeon's finger touch their surface, and then, unpurified, enter the wound, suppuration and fever would follow; that with the strictest antiseptic precautions should a pair of forceps fall on the ground or touch such a seemingly harmless thing as a blanket, and then, unpurified, enter the wound, the worst evils might ensue; that should the surgeon inadvertently bend a limb by grasping it at a part that had not been carbolised, and then return his contaminated hand to the wound, the patient might be doomed!

Bacteriology as a science did not exist. I am not aware that any of Lister's class had ever seen a microbe; their whole faith hung on those three flasks of boiled urine, their oracle and court of appeal. But how could any one who had not heard the counsel for the prosecution and personally examined those all-important witnesses attach due weight to the truths they so plainly taught?

Naturally the outside world failed; want of evidence, want of imagination, and want of training in actual details inevitably spelt disaster.

Nowadays, when every nurse turns up her sleeves and purifies her hands before touching a wound, who putting on her clean print dress in the morning, unconsciously clothes herself with an antiseptic atmosphere; when dressers wear washing coats, and soap and nail-brushes are the unfailing fore-runners of surgical ritual; it all seems so ordinary that we unwittingly form harsh judgments and are impatient of the errors of the past; but

if we try to reconstruct the life of fifty years ago we shall think differently.

Antiseptics then were much the same to the general as radio-activity is to-day. How few understand the principles upon which these modern marvels are based, much less could explain them to a child—the test of real knowledge—and still less manipulate the apparatus, or juggle with a β or γ particle as the masters do? It was the same with antiseptics, they were a revolution in thought, and time was a factor in the case.

One thing is certain, no one who had not followed Lister at work, surrounded by his trained assistants, and personally familiarised himself with the elaborate paraphernalia and almost "automatomised" himself to the meticulous details could have succeeded at all. The "distinguished foreigners" did; they came and stayed till they had acquired the necessary knowledge, but his countrymen came not. A casual discussion at a medical society, a skimmed article in a medical journal, satisfied their curiosity and appeased their appetite; and if they did embark on an antiseptic venture, they were so unqualified for the work that they made certain shipwreck, and henceforth abandoned the matter. And so Great Britain missed the greatest surgical discovery of all time, and had to be converted years later from Europe and America.

I return to the "protective" after this allusion to the absurd misconception which arose about the miraculous powers of carbolic acid, and I do so because it demonstrates so plainly that asepsis, and not antisepsis, was Lister's aim and goal. The wound was to be defended from pathogenic organisms, and this was the rôle the carbolic had to play; but once the dangers

of operative contamination were over the less it had to do with the wound the better. The protective was an improvised skin, the boracic acid solution in which it was soaked the mildest antiseptic, and Nature thus shielded was left untrammelled to carry on her transforming work; all Lister ever did was to protect her from her foes.

Sterilisation by heat was unthought-of, and though its efficacy was so evident upon the boiled flasks of urine, it did not seem to have occurred to him to use it for other purposes, and I never saw anything boiled. The whole subject was in its infancy, and had to be laboriously worked out; it was a slow growth and a long series of careful experiments. Would that Minerva-like it could have burst fully formed from the head of our Jove, but such is not the privilege of science. It is here a little and there a little, and wisely did Huxley compare it to the tackings of a ship against an adverse wind, now too far in one direction and now too far in the other, but progress all the time. But even had heat sterilisation been practised it could not have been used for the protective, as the dextrine would have boiled off, and the silk would have shrivelled to a cord. The fact, however, remains that protective was as near an approach to an aseptic dressing as was then possible.

I must defend Lister from the accusations that were so often brought against him that he was opposed to aseptic surgery. In a sense this was true, but in a very different sense from that in which it is generally understood.

Were this a perfect world in which mistakes are never made, and mind and body worked in perfect unison; were sterilising equipment available in every

house and cottage; were trained assistants always at hand, asepsis might be as allowable as it was theoretically desirable; but human nature being what it is and circumstances being what they are, he held that an antiseptic was not only desirable but necessary, and though to-day asepsis covers an ever-widening field and much that was formerly done by carbolic is now done by heat, yet even the most aseptic surgeon paints the skin with tincture of iodine before commencing operations, and so admits that antiseptics cannot be dispensed with. In town practice asepsis is impracticable and in country practice impossible, and the day is distant when antiseptics will be discarded; but asepsis was the goal to which Lister was ever pressing, and "the protective" was by name and nature the embodiment of the idea.

But, after all, what is heat if it be not an antiseptic? It is only another means to the same end; the one acts chemically, and the other physically, but both effect the same purpose.

It was characteristic of Lister that he never rested upon his oars but was always trying to improve his methods, and though carbolic acid gauze was good he was continually casting about for something better. He tried gauze saturated with salicylic acid; but that made us sneeze, and a sneeze apart from the spray was a perilous matter.

Thymol and iodoform gauze were also tried, and then it was discovered that iodoform was not really antiseptic. He tried one thing and then another, and it was not until years later, and after innumerable experiments, that he devised and perfected the double cyanide gauze, which seemed to fulfil all his requirements. This was his last important work, and I think he considered

it his triumph; it still holds the field for many cases and is used the world over. It was in London at King's College Hospital that he completed it, and he told me that when he was satisfied he had obtained a really satisfactory dressing he should retire from practice.

It seems almost unthinkable that it should have taken thousands and thousands of years for man to learn how to dress a wound!

Ever since man became anything like man he must have pondered the matter in the long and fierce struggle for existence. The life of primitive man must have been beset with innumerable dangers; doubtless he had his remedies for his ever-recurring wounds, and doubtless he was always trying to improve them.

The invention of flint implements, and later of bronze and iron weapons, intensified the problem; and as organised armies came into the field the work of the surgeon loomed more anxious, more important, and more difficult.

Picture the countless millions of men who have met each other in deadly combat. History is chiefly a matter of drums and trumpets; nearly every page is dripping with blood, and after "the tumult and the shouting" died, the treatment of wounds must have been the all-engrossing question.

Think of the great healers of the past in Egypt and Greece, Rome and Italy, France and England, ever revolving this problem and never able to solve it!

Look at the bust of Hippocrates; one feels instinctively in the presence of a master, and that men of his calibre are rare to-day. Run over the names of the leaders of our craft; they shine like meteors down the ages; men who unravelled anatomy, created physiology,

and laid the foundations of medicine and surgery, trying their skill their lives through at the treatment of a wound, and failing.

Come to later times, Paracelsus and Paré, Wiseman and Chopert, the Hunters and Charles Bell, Pott, Cheseldon, Dupuytren, Laurence, Syme, Chessaignac, Fergusson, Diffenbach, Abernethy, Astley Cooper, Civiale, Larray, Liston, Cline, Travers, Langenbech, and a host of others, men of outstanding ability, students, pioneers of thought, worsted in this, the daily work of their lives, and not one of them knowing how to treat a wound.

Well might Hippocrates begin his aphorisms with the incontrovertible statement: "The Art is long."

All the wonders of modern knowledge, the distances and composition of the stars, the harnessing of steam and electricity, the revelations of biology, the drama of evolution, the archives of geology, the transformations of chemistry, and countless hosts of other discoveries; yet no one knew how to render a pin-prick harmless or dress a finger till Lister came!

I have said much about carbolic acid, for it was our sheet-anchor and everywhere in evidence. In singling out carbolic acid from the other components of German creosote many valuable antiseptics were left, and these have been appearing ever since, but the point Lister insisted upon was that "carbolic acid penetrates grease." If any one questions its penetrating powers let him mount a small insect in phenol, and in a few days it will become transparent. And when one remembers that the antiseptic properties of soap and water were unknown, and that a swabbing of the skin with 1 in 20 was all we had to trust to, it is easy to see how well

adapted it was to the work. He fully admitted the overwhelming power of perchloride of mercury as a germicide; but perchloride coagulated rather than penetrated, and was besides horribly poisonous, but it had a place in his armamentarium, and a Winchester quart of 1 in 1,000, coloured light blue, was never absent from the scene. But it affected steel, which carbolic acid did not, and this was further against it. I do not quite remember for what purposes it was used, which certainly was not often, and then rarely without the comment that "Perchloride does not penetrate grease."

Later on carbolic acid was dissolved in olive oil, and used as a dressing for small and healing wounds, and for some time its virtues were unquestioned; but it was discovered that it was almost devoid of antiseptic properties. I suppose the acid had such affinities for the "grease" that nothing was left over for the germs.

Years later, in one of his King's College lectures, he told us that he had almost given up 1 in 20 for surgical work and had come to rely upon 1 in 40, and it had happened in this way.

In a surgical home to which he sent patients the sister herself made up the lotions, and by mistake supplied him for some months with a 1 in 40 solution instead of the usual 1 in 20. His cases, meanwhile, did remarkably well. He at once profited by her error, and was pleased that he was able to rely upon the weaker solution.

In spite of the lavish use of carbolic acid, I never saw a case of carbolic poisoning in his wards. Occasionally a child's urine would become a little dark, and then carbolic was used more sparingly and the symptom subsided. The darkness suggested nephritis, but the

colour was not due to blood; no doubt a modern chemist could glibly tell us what had happened.

He was fond in septic cases of swabbing the part with a solution of chloride of zinc of 20 grains to the ounce; he used to say it gave the tissues a three days' grace, and allowed time for defensive granulations to get into working order. This was invariably applied in all operations about the mouth, and he thought very highly of it.

It is not generally known that it was he who introduced boracic acid into surgical practice. He was led to do so by reflecting upon the healing properties that borax had upon the mucous membrane of the mouth. Boric acid was hardly poisonous, and almost non-irritating, but just sufficiently active to keep the germs at bay. Its fame is now world-wide, but few know to whom they are indebted for its help.

The ointment in those days was never a success; being made with lard it crumbled and curled, and was difficult to spread—vaseline as a medium was then unknown. We scraped it upon muslin, one man holding the cloth and the other working with the spatula; it was a tiresome process and took a long time; it had a way of curling and peeling off, and none liked it except the wounds!

Slowly but surely Lister realised the germicidal action of the living tissues. Nothing was then known of phagocytosis, neither was he acquainted with the power the serum possessed for dealing with the germs. When an abscess was opened and serum succeeded pus, he thought its action was largely mechanical. He had great faith in the germicidal power of the mucous membrane of the urethra: how could it be otherwise

when catheters were invariably septic and yet the urine often remained sweet? He regarded it as one of the many "beautiful provisions of Nature," a phrase that was often upon his lips; if ever he could put in a word for "Nature" he did, and was never tired of pointing out her attempts to help and to heal. We all forget how long she has been in practice and what a wonderful doctor she is; it is only in recent years that we are beginning to realise the æons that she has been practising antiseptics, and that our very existence is a proof of her success.

Nature never does anything for fun, never makes a joke, never takes a holiday, and never strikes. The tint of every leaf, the list of every stalk, the place of every hair are all entailed by the unswerving law of necessity, everything means something could we observingly distil it out.

What are carbolic acid, salicylic acid, thymol, menthol, and all their tribes but antiseptics evolved for the defence of the plant?

Who could have thought that "in the sludgy, squdgy creek" of the murky swamps of the gloomy Coal Measures, the plants from which we get our tars, were ceaselessly elaborating antiseptics, the success or failure of which were life or death to them?

We are only playing their cards and taking our tricks with their trumps.

> "That which hath been is that which shall be; and that which hath been done is that which shall be done: and there is no new thing under the sun."

CHAPTER XII

RECOLLECTIONS OF MY DRESSERSHIP AND CLERKSHIP

In an earlier chapter I have briefly described the wards of the Royal Infirmary which were under Lister's care. The building was never designed for a hospital, but was built for the old High School.

When the infirmary became too small for its increasing needs, the surgical wards were transferred to new quarters, about a half to a newly erected block of grim stone buildings sandwiched in between the old infirmary and the High School; but the University surgical wards were placed in the old school buildings, which had been acquired by the authorities.

Edinburgh has for long been called "Auld Reekie"; a name the town acquired from the pall of smoke that always hung over it, and it deserved the name.

The Royal Infirmary was situated after the manner of those days in a densely crowded area; ground was valuable, and many of the surrounding houses were seven and eight stories high. Near by was the Cowgate with its historic associations, slum quarters, crowded but picturesque narrow courts, and squalid and degraded inhabitants.

In the present day it would have been deemed an impossible site for any hospital; but sanitary science had hardly dawned, and the value of sunlight and fresh air

were almost unknown; but things were moving and public opinion was awakening, and the splendid liberality of the citizens, always alive to the interests of the University and the needs of the sick, had recently acquired a magnificent area facing "the Meadows," where the walls of a new Royal Infirmary were rising in a series of spacious pavilions, bathed in sunshine and washed with fresh air.

The work took several years, and before it was completed Lister had left Edinburgh for King's College, London; and it was in the septic old buildings, in the face of all that modern sanitation would condemn, that his victories were won, and antiseptic surgery was established.

Smoke, dirt, and gloom surrounded his wards, which facing east and west missed most of the little sunlight that was available, and if the necessities of a modern entourage are considered Lister had but a poor chance.

The buildings were old, their sanitary arrangements primitive, and the wards neither lofty nor well lighted; there were no through currents of air, the windows with few exceptions being on one side of the ward, and those I hardly ever remember opened. What outside air found its way to the wards filtered in through dark and smelly passages; the floors were sprinkled with sand, and though, I suppose, they were occasionally washed I never saw such process in evidence. But over and above all these disadvantages the buildings had been infested for decades with pyæmia and septicæmia, which still kept their strangle-hold on the neighbouring wards of his colleagues.

The smell of the building was distinctive, a compound

of carbolic acid, stale tobacco smoke, and distant boiled beef—the usual dinner of the patients. I have no reason to think there were bathrooms as I never saw any.

It is sad but salutary to recall these details ; they show how far we have travelled, and the conditions against which antiseptics contended and over which they prevailed.

The presiding genius of the wards was Mrs. Porter. I beg her pardon, I ought to have said Mistress Porter, as this was how she was addressed in accordance with the national etiquette of her class.

The mention of her name will be welcome to old students ; she was without question a great character, and ruled the domestic and nursing arrangements with a benevolent despotism ; her sway was absolute and her word was law.

At St. Thomas's the Nightingale nurses were everywhere. Their fresh bright faces, and spotless print dresses, were rivalled only by the flowers with which they decked the wards. But such were never seen in Lister's wards, and, strange to say, we did not seem to need them !

Mistress Porter, sitting in her little room off the passage, the pink of order and neatness, did all as by wireless. Doubtless she was an early riser and was working when we were asleep. She was one of those wonderful people one occasionally meets who do everything, but never seem to be doing anything.

She must have been well over seventy. Her hair was white, her face lined and wrinkled, but her complexion would have done credit to a girl in her teens. Her eyes were of a cold and piercing blue,

searchlights, but could at times twinkle with a roguish humour, conveying both instruction and rebuke. She wore the tightly laced corsets of the period which, struggling with a protuberant abdomen, lifted her waist almost to her arm-pits: her snow-white, closely fitting, goffered cap, and capacious white apron, showed to advantage against her grey-blue stuff dress, which looked as though it had never been new or would ever get old. She had long lost her teeth, and would have considered artificial ones a reflection upon the arrangements of the Deity, and would munch her jaws with significance when roused or angered.

She was a Scotchwoman of a very pronounced type. Her speech bewrayed her: her penetrating, stridulous voice echoed through the building, and by it we generally knew where she was.

Wonderful legends were current of her service. She had braved the icy winter of the Crimea with Florence Nightingale; had mothered Mr. Syme during his professorship, and so had known Lister from his early manhood. He had the greatest respect and regard for her, and was, perhaps, if the truth were known, a little if not really afraid of her. She had a habit of suddenly and instinctively appearing, and asserting her authority on behalf of some ill-used sheet or badly treated blanket; and he submitted immediately, never daring to cross swords with her, but playfully shrugging his shoulders and glancing archly at us as much as to say "resistance is hopeless."

In a perfectly superior way she approved of him, and regarded him as a reputable son whose worth she recognised but who must not intrude upon her authority. She considered she was essential to his success, and

Photograph by J. G. Tunny]

MRS. PORTER

(*From Prof. Chiene's "Looking Backwards"*)

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bore her cares and her honours with fortitude and dignity.

She would sit in her little room, a few feet square only, the pink of order and neatness. A large-print Bible lay upon the round table, generally open at the Psalms, upon which reposed her folded silver spectacles.

We would nervously enter, make a few remarks or ask a question, but none of us dared to stay more than a few minutes. But she had her favourites, and would talk and joke, and sometimes almost coquette, but not for long. She would wave us away with her weather-beaten hand and bid us "get on with our business"; when we at once departed, fully sensible of the honour of the interview.

She was a stern mother; we went to her in our difficulties (if we had a good case) and sought her advice. Natural gift and long experience had made her a mistress of her craft: she always knew what to do and how to do it. In making a patient comfortable she was a witch; splints, sandbags, and extensions swayed to her hand as mountains and trees bent to Orpheus's lute. She had a wonderful knack of adding a finishing touch, as though it was something we were about to do, but had just left it to her to finish. "She taught as though she taught us not, and things not known as though they were forgot," as her stern sense of discipline repressed the slightest assumption of superior knowledge.

She never seemed to take a holiday and rarely left the building; her work was her life and her life was her work, and under an austere personality she carried a heart of gold.

With the patients her work was peerless. No one

was neglected, no one was fussed; her presence brought relief, inspired courage, and engendered hope.

Nurses are heaven-born. Unless a trained nurse be a born nurse she is a doubtful blessing. The instinctive sympathy, observant eye, and needed help, can neither be learnt from lectures nor acquired by art; they are the highest gifts of divine womanhood. Well might Professor John Chiene say: "When I am ill I want no nurse but my mother."

W. E. Henley was for some two years, on and off, a patient in her wards, and wrote these striking lines; and in spite of what he says, neither Rembrandt nor Walter Scott, nor both together, could have portrayed her better.

> "The greatest masters of the Commonplace,
> Rembrandt and good Sir Walter, only these
> Could paint her all to you; experienced ease
> And antique liveliness and ponderous grace;
> The sweet old roses in her sunken face;
> The depth and malice of her sly grey eyes;
> The broad Scotch tongue that flatters, scolds, defies,
> The thick Scots wit that fells you like a mace.
> These thirty years she has been nursing here,
> Some of them under Syme, her hero still,
> Much is she worth, and even more is made of her.
> Patients and students hold her very dear;
> The doctors love her, tease her, use her skill.
> They say 'The Chief' himself is half afraid of her."

Lister's staff consisted of twelve dressers, three clerks, and a resident surgeon (or as would more generally be called, house surgeon). The appointments were for six months, and personal application was necessary. In London, we put down our names at the medical secretary's office, but here we had to call upon the professors. It was rather an honour to dress for Lister

even in those days, and his list was always filled some two years ahead. Murchison's letter paved the way for my acceptance, and I was welcomed for his sake.

It was generally the best men who applied for the dresserships; those who had done well in the classes and were interested in their work, as they knew they would get little examinational help from him and would be led into paths that were outside the curriculum, as no examiner would then have dreamt of officially recognising antiseptics, much less of making them a test. The curriculum was crowded, and the examinations pressed closely upon each other, and it required both courage and enthusiasm to spend valuable time upon that which had no marketable value. There were several Quakers amongst the dressers; earnest, serious men, intent on doing their best, and not a few of his men rose to subsequent distinction.

But a dresserships under Lister was very different from one in London: there each surgeon had only four dressers, who had three times the number of beds under their care and were people of some importance, as the one on duty in his surgeon's "taking-in" week had quite responsible work. They had served, moreover, as out-patient dressers, and had gained some experience. At Edinburgh there were no out-patients, and therefore each man was new to the work.

Lister's dressers were largely serving-men. They held tins of lotion, fetched and carried, and lifted and moved the patients; but were never allowed to dress serious cases. They were learning antiseptics and struggling for a clerkship later on, and as only three clerks would be chosen out of the twelve dressers the competition was severe.

I remember my first duty, and hope I may be pardoned a glow of pride at being in at the start.

Lister was always hunting for milder and less irritating antiseptics, and it occurred to him that borax, which was so healing for sore mouths, might be equally serviceable for sore wounds; so he worked up some boracic acid with lard at home and brought it to the hospital. He thought it might be spread upon butter-muslin and beckoned to me to help him.

Butter-muslin is refractory; it is thin and yielding, and he had great difficulty in getting the ointment to adhere to the cloth; it crumbled and curled, and as soon as one part was covered the other was bare; but he worked away with a spatula whilst I held the muslin and at last got a fair surface, and bearing the plaster on extended hands, I followed him to the case.

Boric acid has long been used the world over; there is no ointment that is better known and more generally employed. The village child takes his mother's penny, and making his way to the general shop buys a little tin of it, which works wonders with his superficial ailments; but he will never know that it is Lister who is curing him!

Its success was immediate, and the old-fashioned zinc ointment, which had held its own for centuries, received almost a death-blow; eyes, ears, and skins yield to its beneficent sway. Later, Lister found it rather retarded epithelial growth, and he reduced the strength. The substitution of vaseline for lard came years after and was a great improvement.

To Lister, his dressers were always "Mr."; he never called us by our surnames only. No matter what the emergency, this epithet was never omitted. We did

not quite like it; we did not actually dislike it, but we felt it was a little barrier. He invariably treated us with the most courteous regard, as indeed he did every one, but habitual politeness is rather embarrassing; he was shy and we were restrained.

The clerks were the non-commissioned officers of the squad, and did responsible work; in addition to which they instructed and superintended the dressers.

During each course of clinical lectures there were three written examinations. There were no text-books, and we had to depend upon our notes, which were a strange medley of "what Mr. Syme" had "said," boiled flasks of urine, the evolution of catgut ligatures, the mysteries of hydrocele fluid, the revelations of the blood clot and serum, the contraction of fibrous tissue, the incisions for his operation of excision of the wrist, etc., etc. What the Colleges of Surgeons would have thought of this strange jumble I cannot think, and how any student would have fared had he limited himself to this pabulum I do not like to conjecture, but to us they were the surgical gospel.

It was an age of note-taking. Some of the professors lectured almost as dictation; but notes should be notes, pegs on which to hang points. Probably it was a survival of earlier days when text-books were few. But though this applied to serial lectures it had no reference to Lister's, which broke new and unfamiliar ground, and our only chance lay in writing. We got down what we could, copied his diagrams, noted the cases, and obtained the best record we were able.

I was never more surprised than when, on the last day of the course, my name was read out a medallist; of course, I knew it meant a clerkship.

It was a piece of luck, for the subjects were so peculiar that far more depended upon getting a question that suited than upon special proficiency in what might be called clinical surgery; especially when one considers how impossible it is to assign numerical order in a class of over three hundred men. But I will not quarrel with the Fates, and shall always be deeply grateful for the honour I received at his hands.

I have described how the clerk's work was apportioned: one for the spray, one for the instruments, and one for the chloroform, each in rotation for two months. They had to take notes of the cases, and dress them as soon as the risk of operation contamination was past. Four dressers were assigned to each clerk, who had to break them in, teach them their minor duties, and initiate them into the mysteries of the antiseptic ritual; it was responsible work, and we were sensible of our trust.

Antiseptics were on their trial and had to win their spurs, and if through our fault a case went wrong, which I am pleased to say it seldom did, the eyes of the foreigners were upon it and the truth of Lister's theories was at stake.

One afternoon I was dressing a case of psoas abscess, and the Professor made a surprise visit, accompanied by two foreign professors. They paused at the foot of the bed, Lister explaining the case and expounding the dressings, and then in a most impressive voice, said: "If this gentleman dares to let a single germ enter this wound he will be as culpable as though he took his scalpel and plunged it into the patient's carotid." The foreigners bowed in polite acquiescence, and glared at me as though I were some dangerous animal. To

my relief they soon passed on, and instinctively I dipped my hands in carbolic lotion and hoped I had not betrayed my trust. It was no light matter working under such responsibility, but this was the spirit in which all the work was done; we knew that Lister relied upon us not to fail him.

There was little beyond our work to engross us. Athletics were a minor quantity. The most fashionable pastime was the University Volunteers, commanded by the veteran Professor of Materia Medica, Sir Robert Christisson; but this took up time. Football hardly existed, and cricket was almost unknown. The only student's club was the Royal Medical Society, an ancient and austere debating society. There was a rowing club, but Lister's people were not rowing men; we worked our hardest. Scotchmen are not triflers, and the serious earnestness which has always characterised the race was not absent from the university. Doubtless it would have been better if we had had more exercise, but there was no time for it.

Over the clerks and dressers was the resident surgeon (house surgeon), who was a graduate, and had charge of the wards in the Professor's absence; he was a busy man and rarely off duty. He held the appointment for six months and was chosen from the clerks.

The Professor paid his daily visit at noon. For half an hour before, a general bustle ensued, above which the hissing of the sprays was heard getting up their steam. Mrs. Porter was now in evidence, giving her orders right and left, clearing the course, and seeing that everything was in readiness; moving rapidly from ward to ward, desperately in earnest. Slowly and solemnly the open landau and pair of horses turned the

corner at the top of the hill, and carefully descended to the hospital yard; we knew its clatter as it rumbled over the stones. It was a dignified equipage and Lister looked well in it, looked the part every inch. The crowd of students was gathering, generally some thirty or so, and the foreigners were turning up. The Professor quickly alighted, and though well over fifty and inclined to stoutness, tripped up the stairs, often taking two at a time, to the upper floor where was his private room. They say that great men never run—Aristotle in his Ethics goes further and says: "The high-minded man will be slow in his movements;" but Lister hurried to his work, and even in passing from ward to ward walked briskly. Arrived at his little room, hardly more than a few feet square, he was closeted for a few minutes with the house surgeon, and then a reception of the visitors was held. They were a grotesque collection of Scandinavians, Danes, Germans, Russians, Poles, French, Italians, Americans, and Japanese, rarely less than two, and generally three or four. There was a great deal of bowing and card presenting, Lister most graciously receiving them all, smiling kindly, and inquiring now in French, and now in German, about his foreign friends who had given them their introductions. After a few minutes a start was made for the wards (Mistress Porter had now retired to her little room and was earnestly knitting, apparently unconscious that anything was going on!), Lister dividing his attention between the foreigners and the leadings of the house surgeon. He spoke French and German fairly well, and the foreigners seemed to understand, or were too polite to show they didn't.

They were a strange medley: the distinctive cut of

their clothes, the shortness of their hair, the heaviness of their moustaches, the diversities of their noses, and their invariable myopia, nearly all of them wearing glasses, unusual to Britishers of that day.

A bed approached, the patient was greeted with the kindly smile, and the dressing examined to see whether the discharge had "come through," and if it had, a change of dressing was imperative.

One of the great advantages of the new dressings was that the wound could be left undisturbed for many days, frequently until healing was completed; and this was a wonderful advance upon the old methods where the dressings had to be constantly changed, which entailed repeated disturbances and consequent delay of the healing process, to say nothing of the time the dressings consumed. The familiar stenches were welcomely absent, the sickening fetors being replaced by the cleanly smell of carbolic acid; the surgeons of to-day have little idea of the odious evils they escape!

A change of dressing being required, the spray was turned on and basins of 1 in 40 carbolic lotion handed, into one of which scissors, forceps, probes, and instruments were cast, whilst the hands of the workers were immersed in another. Lister insisted upon having a piece of gauze always put into the lotion for washing purposes, and it is strange how often this was forgotten—there are some things which seem doomed to be forgotten! Time after time he would turn to the dresser, and plaintively ask, "How can I apply the lotion with my fingers?" The bandages were then cut with bulb-pointed scissors to avoid pricking the patient (one of the many little things I believe he originated), and the corner of the dressing carefully lifted, particular care

being taken that a full cloud of spray followed the dressing as it was being removed; the Professor then smelt it, and then carefully smelt all round the edges, and after a smile of satisfaction that it was "quite sweet," would hand it round to the foreigners to verify the fact. The drainage tubes were then removed, washed in carbolic, shortened if necessary or replaced by smaller sizes; care being taken that their outer ends coincided with the edges of the wound, and the rule followed that the tubes must be pushed out by the healing of the cavity before they were shortened in order that drainage from the bottom might be assured.

Union by first intention was the rule, the edges remaining natural and the stitches free from tension.

If a stitch was tight it was snipped rather than removed, and Lister would delightedly say that, owing to the proper resilience of the catgut, it still gave support and acted as a splint.

He was fond of pointing out how epithelium would creep down an inclined surface but would not descend a cliff, and if any such was present it was pared away to invite descent.

Any attempt to tear off a dry dressing met with an unfailing rebuke; it must be carefully soaked off no matter how long it took. To tear off a dressing was to tear off thousands of young epithelial cells, and to destroy the work of days of healing. Gentle in all his manipulations, he was never so careful as when he was dealing with young epithelium.

Before his discoveries no one had seen a wound healing under unhampered conditions; every wound was worried by and struggling with invading organisms; but now, through the transparent protective, Nature

could be studied, and it afforded him the keenest pleasure to follow her methods; and he never tired of pointing out the beneficent arrangements she had devised, and the obligations we were under to protect her in the work.

In cleaning a wound he insisted upon our always working from the centre to the circumference, as if otherwise, dirt is swept in. "Always work from the wound but never to it," but it is strange how seldom this is followed; it seems ingrained in man to reverse the method.

He was great on the treatment of sinuses, not those of his own making, for under antiseptics they seldom arose, but of the old pus paths that frequently found their way to the infirmary. He had devised a sinus forceps, known to this day as "Lister's sinus forceps"; very narrow in the blades, and very useful they were as they combined both probe and forceps. They could pick out small foreign bodies, carry drainage tubes to the bottom of the wound, and were good for a variety of purposes.

Volkman's sharp spoon was also frequently in use for scraping hard edges of ulcers, and the walls of sinuses where epithelium had crept down the track. Volkman was one of his earliest converts, and "Volkman of Halle" was often upon his lips. Whether his partiality for the spoon was an unconscious tribute to the distinguished surgeon who had heralded the new system in Germany I know not, but it always had a place upon the instrument tray.

A thorough probing and fishing about with the sinus forceps, a scraping of the track with the sharp spoon, a thorough swabbing of the channels with a solution of chloride of zinc, 20 grains to the ounce, and a deeply

inserted drainage tube often did wonders. Every sinus that could be slit up was, of course, attacked, and deep pressure cleverly applied to approximate the cavities. He was very pleased if he succeeded where others had failed, not from any personal glorification but because the sufferer was helped.

Chronic ulcers of the leg, that most surgeons disrelish, were other of his pets. He would point out how common they were and how much disability they caused, and that, therefore, they merited our care and interest as much as more serious cases.

He would tell us how Mr. Syme used to turn a chronic ulcer into an acute one, by the application of a fly blister all over it. The edges were then pared and skin was grafted, and under antiseptic dressing excellent results were obtained.

He revelled in skin grafting, but insisted on the necessity of only adopting it on suitable surfaces, of cutting the grafts into very small pieces, and always placing them the right side down. Each was covered with a square inch of protective and left undisturbed for several days, the top dressing only being changed if necessary. He would demonstrate how the graft seemed to melt away, but the little star of new skin cropped out a few days later.

One of his chief delights was to fill a space with an organised blood clot; this, of course, was impossible before antiseptics. It did not always or often succeed, but when it did it was a triumph. A coating of grafts was later applied and weeks of tedious healing shortened.

Apart from their ordinary use a great deal was made of towels; they padded splints, which were rolled into

their ends; fractures of the leg were cradled in them, the front being left open for inspection, *and massage*.

Lister was the first I ever saw massage a fracture; he worshipped the blood, and designedly evoked it to mend the bone. This will seem strange to modern ears, but it was novel then. I had heard enough of "immobility" in London rising into the newly introduced plaster of Paris encasements, a method which grew out of the Franco-Prussian War of 1870, of callous poured out and growing into bone, but I never remember it associated with blood supply—like Topsy, I thought it "just grew." It was another instance of his reverence for physiology as the true helpmate of surgery.

Periosteum was another cosset of his. He would carefully peel it off and preserve every little bit, and when he could not fit it in would tuck it into the wound.

Fractures were rarely covered with the old continuous bandage; bandages were looped at intervals round the splints. The blood circulated better, and the air had greater access to the part, which was thus placed under healthier conditions; inspection was easier, and the readjustment of necessary pressure facilitated.

A novel thing to me was placing a pillow under a fractured limb, and looping it with bandages to the splints. It acted as an additional splint, raised the limb, and curtailed movement, especially should the patient move in his sleep; and acted as a comfortable and kindly clog.

The old-fashioned, hard, unbleached calico bandages were rarely used; gauze took their place, which was easier to handle and much more comfortable to the patient.

The free use of safety-pins was another feature.

Whenever a bandage had passed the stretching point, and was obviously going wrong, it was halted with a safety-pin, and a fresh start made; the old-time geometrical bandaging was abandoned.

Lister was great on safety-pins, which were always in evidence, and it shows his care for small details that he preferred black ones to white, as they were easier seen and less liable to be lost.

He was fond of pointing out that a safety-pin should be inserted parallel to the line of strain and not across it as, if so, it might buckle and tear away if subjected to much strain. Who but he would have thought about the line of strain upon a safety-pin? But success depends upon attention to detail.

When all was finished he would say to the patient: "Now are you quite comfortable?" He held that absence of strain was a factor in healing, and a necessary precursor of sound sleep. If any discomfort was complained of he would remove the bedclothes, examine the part, re-arrange the pillows, re-adjust the sand-bags, and change the position of the limb till comfort was obtained. A case was never left until the patient admitted that he was comfortable.

> "Oh! the little more and how much it is,
> Oh! the little less and how far away."

Very little medicine was given, and it was a surprise to me that patients could get well without it. It was an age of physicking, and patients expected their bottle, and if nothing definite was indicated a tonic was considered desirable. Medicine and magic are not yet divorced, and customs die slowly.

Occasionally he would order mercury, iodide of

potassium and iron; but rhubarb and soda was the favourite, and he would quote Mr. Syme that: "If rhubarb and soda will not cure the patient, nothing will"; but only a few were regaled with this dainty!

I do not remember him ordering alcohol, and this was then strange, considering that it was regarded as a panacea for all ills, and that his father had been a prosperous wine merchant; and it shows how far he was in advance of his time, and that he had not studied Nature in vain. Did not she work her miracles without it? and as she gave no lead, I conclude he did not presume to suggest it. In London a simple fracture of the leg had its daily pint of porter, which was regarded as a potent factor in bone mending.

The old-fashioned linseed poultice that Abernethy and his confrères esteemed so highly was also declining; but Lister would quietly chuckle and say that all along it had been an unconscious antiseptic, for was it not made with boiling water? But hot boracic fomentations were taking its place; it is one of the good old remedies now out of date, and on unbroken skin excels its modern rival, which does not well retain its heat and lacks the kindly mollifying oil, and as a soother of pain is far superior. Sir Lauder Brunton once said to me: "Never forget those two P's—pain and poultice," and it has given ease and sleep to thousands. But I suspect Mistress Porter did more with linseed than we wot of, as one can hardly imagine her discarding so old and trusted an ally, anyhow before the case came under official care; and I can fancy her saying: "Ah weel, but Professor Syme used them." Later on they were made with boiling boracic lotion, and both schools of treatment were satisfied.

Lister had great faith in the actual cautery and was fond of Corrigan's button, especially in cases of sciatica; but in bad cases he would cut down upon the nerve and stretch it, and often these did well.

In joint troubles he would constantly ask whether the limb "jumped at night," and if so, would diagnose ulceration of the cartilages and apply the cautery, and if that failed would boldly open and explore the joint.

I remember the horror with which I first saw him freely open a knee-joint and turn out several melon-seed bodies. I had been taught that such was absolute anathema; knee-joints and the peritoneum were sacred, and except in desperate cases, inviolable. Judge, then, of my surprise when some days later I saw the patient sitting up in bed reading the newspaper. Nowadays it is a commonplace, but then it was a forlorn hope.

Contrary to the practice of hospital surgeons, he liked to keep his patients in till they were nearly cured; he held it was better to cure one than to patch up two. There was no convalescent home attached to the Royal Infirmary, and antiseptics had not reached the outside world, and he feared the probability of the case going septic upon which he had spent weeks of special care, so chronic cases, such as psoas abscesses, were kept for months.

The managers did not like it and would, he used to say, protest to him against it; but he took little heed of their admonitions and had his way, and they were too conscious of what he was doing for surgery to quarrel with him.

Apropos of patients being kept a long time in the hospital, Lister one day said: "Who knows, it may be that whilst here they may have a chance of learning

something of the meaning of the word Gratitude." It struck me as irrelevant, as I had never regarded hospital residence from the grounds of its ethical uplift; but experience has suggested what was probably in his mind. It is really remarkable how seldom a hospital patient expresses gratitude; I think the poor are fatalists and take things as a matter of course.

Maybe they feel themselves unable to frame suitable phrases; perhaps they may think it might be taking a liberty; possibly they believe the doctors are paid; but the fact, strange as it is, remains.

An African traveller once told me the Kaffir has no word in his language for "thanks," and it throws a light upon the primitive mind; and one is forced to conclude that gratitude like everything else is a development, and that in the course of time there may be more of it.

I was discussing the subject one day with a locomotive driver, who turned out to be a bit of a wag, and roguishly said: "Oh! but you must not say there is no such thing as gratitude because I have heard the word is in the dictionary, and once I saw it painted out as the name of a barge."

But when one considers all that the hospital means to them, and that not only are they treated for nothing but are boarded and lodged free of expense it does seem remarkable; and one needs to be a Stoic and to school oneself into remembering that "the reward is in the doing," and the sooner the young doctor learns this the better for his peace of mind. It is the old question: "Where are the nine?" And I fancy Lister was thinking that removed for a time from their sordid surroundings into the altruistic atmosphere of the

hospital, they might have a better chance of learning more of this exceptional virtue. But to the managers, who were concerned with finance and statistics, it had not occurred to view it in this light, as by no sort of actuarial manipulation could the item be brought to figure in their balance sheet.

But I leave this unsavoury subject, and have only recorded it because it is part of his memorabilia, and it made an impression upon my mind which years of hospital experience has confirmed without doing much to explain.

Lister was gifted with a very even temper and a sweet disposition, and the failures of his underlings never caused loss of self-control or irritation.

Naturally, in the early days of antiseptics, the details of which were so unusual and punctilious, ample scope was afforded for annoyance and irritation at the mistakes which were inseparable from the new methods; but he was always calm, and what he said was said in sorrow, not in anger.

Like Socrates he held that all wrongdoing was ignorance, and this was particularly true of antiseptic wrongdoing; and he worked on, line upon line and precept upon precept, and never wearied, and his patience seemed inexhaustible.

Many a suggestive side glance was given, many a pause ensued, and many a sigh was heard, but the instincts of the perfect gentleman prevailed.

But there were exceptions; any want of consideration for a patient's feelings, any roughness that might cause unnecessary suffering, inevitably evoked a serious rebuke.

An uncovered instrument tray was one of these.

It was a rule that all instruments likely to be required in the wards or theatre *must* be covered with a towel, and woe betide the clerk if he omitted this.

Lister would pause, no matter what he was doing, and flushed with a glow of suppressed but dignified indignation which was arresting in a remarkable degree, ask peremptorily for a towel and throw it over the tray, and glance at the clerk with unmistakable meaning. Of course, the mystified and spectacled eyes of the foreigners trained themselves upon the culprit, and added additional discomfort to the transgression.

A terrible incident rises before me, terrible indeed because I was the delinquent.

Lister had a rule that every knife after it had been used should be sent to the instrument-makers for re-setting. I was instrument clerk and had I suppose forgotten to send them. One day an abscess had to be opened, and when all was ready Lister turned to me, his face wearing the usual look of careworn earnestness, and said, "A knife please, Mr. Leeson," and I handed him a scalpel. He carefully, as was his wont, tested its edge upon the palm of his hand, found it defective, and solemnly and slowly walked across the ward and put it upon the fire.

Retracing his steps to his former position, in exactly the same tones he repeated his request: "A knife please, Mr. Leeson."

I handed him another scalpel; again he tried its edge, and again walked to the fire and placed it upon the coals.

The scene can be better imagined than described. The patients were amazed at the extraordinary sight of the Professor burning his instruments; the students

were galvanised to attention, glancing now at Lister, then at me, and those on the outskirts of the crowd suddenly aroused to extraordinary curiosity to discover what it was all about. The foreigners seemed utterly mystified; there was much that was novel in antiseptic ritual, but the burning of knives overpassed all.

Lister solemnly walked back to his old position, and for the third time in exactly the same tones, said, "A knife please, Mr. Leeson." With fear and trembling, and hardly knowing what I was doing, I handed him a third scalpel. He tested it like the others, and to my joy and relief it passed muster. He then slowly raised his eyes, and looking me full in the face quietly and deliberately said, "Thank you, that will do"; and then after a pause drew an unusually deep breath, as though to nerve himself for the effort, and with an expression I shall never forget, said, "Mr. Leeson, how dare you hand me a knife to use upon this poor man that you would not like to have used upon yourself?" I cannot describe my feelings, I thought I should have to pass through life with the brand of Cain upon me; the foreigners seemed more than ever conspicuous, and even my fellow-students appeared to join in the reproach, and to be surprised that such a traitor had been discovered in the camp. How I got through the rest of the visit I do not know, but Time is a healer and buries all in oblivion, and somehow I struggled back into ordinary life again, and we all learnt a lesson we could never forget.

Many years afterwards a nurse who had worked under him at King's College said to me: "Well, there are only two kinds of doctors, those who have and those who have not been trained by Sir Joseph Lister."

It was an unsolicited testimonial, and I cannot forbear him the praise. I know what she meant, and that she was referring to his tender solicitude for the sick which spread as an emanation from his presence, and permeated all who came into contact with him. There was that about him which lifted medicine on to a higher plane removed from all personal consideration, a scientific problem to be solved, and a gracious opportunity of ministering to the need of a suffering creature. Two other sayings of his were: "Never ask a patient if he has had syphilis. If you know your work there will be no need to do so, and why add to the poor fellow's transgressions by tempting him to tell a lie; surely he has done wrong enough already."

"Never mention the word 'scrofula' to a patient." A little girl came with the usual series of strumous abscesses, as we then called them, abscesses in her neck, and the clerk who was examining the case asked the mother whether there was any scrofula in her family. Lister called him aside and said: "I fear you do not realise what you have done: you have thrown a cloud of anxiety over that poor woman's life by suggesting there is scrofula in her family, and have placed upon her a life-long burden."

And what of the patients? Their confidence in him was absolute and their reverence boundless; they punctuated their lives by his visits, and the pride of being under Professor Lister half reconciled them to their woes, and if happiness can be associated with a hospital ward it was theirs in measure. They knew that if relief was obtainable they would get it; his directions were their law, and his concern for their troubles a new experience in their lives. His smile suffused them with

comfort and hope, and his kindness engendered a sense of worth to which many of them had been unaccustomed.

Here is the delightful doll story; it occurred, it was said, in his wards at Glasgow.

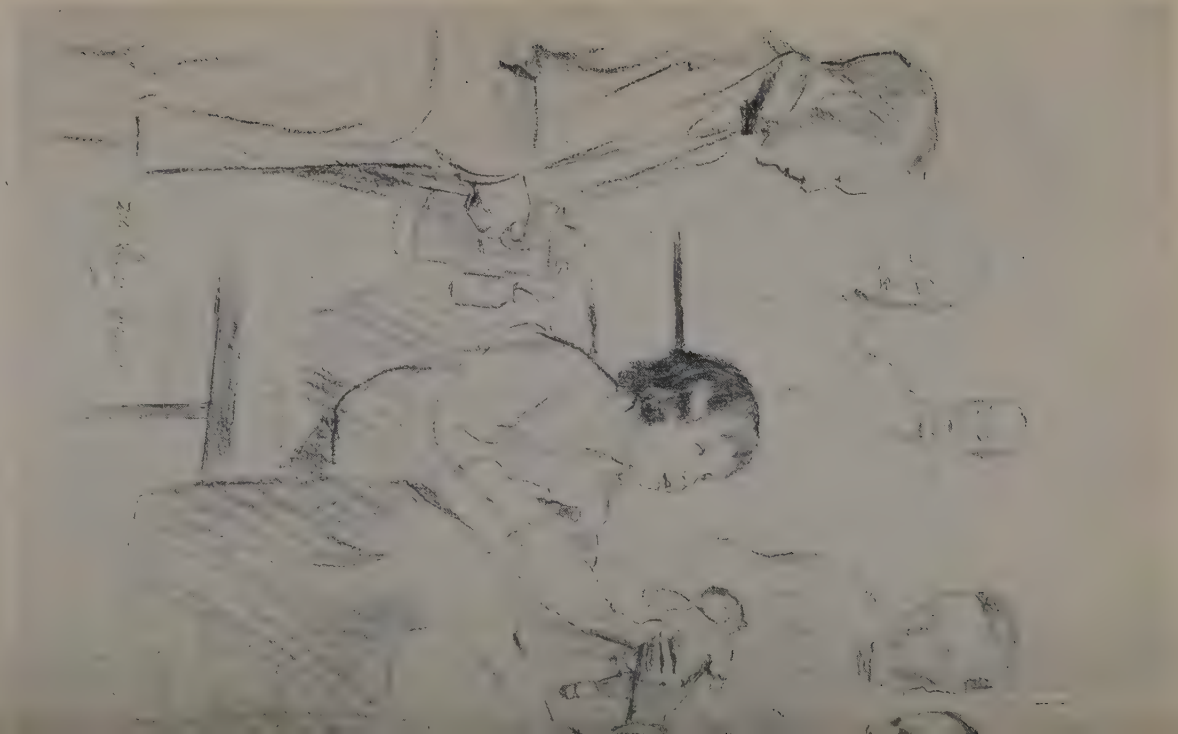
A little girl was suffering from an abscess of the knee. As Lister came to her bed he greeted her with his accustomed and delightful smile. They understood one another perfectly, and he dressed the joint.

When all was finished she produced her doll which had lost a leg; a fumble under her pillow brought out the limb, and holding dolly in one hand and the leg in the other, gravely handed them to Lister. With seriousness and concern he received the case, shook his head ominously, for it was very serious, fitted them together, asked for a needle and cotton, and carefully and securely stitched on the limb, and with quiet delight handed her back to her mother. Her large brown eyes spoke endless gratitude but neither uttered a word.

In the *Weekly Scotsman* of April 15, 1922, there appeared the following appreciation from the pen of Dr. J. A. Erskine, under the heading "Tales of the University":—

"LISTER THE LOVEABLE.

"Lister was a great figure in my day. His personality was a charming one, so modest, and yet so brilliant, and painstaking and conscientious. He had the highest ideal of what a doctor should be of any man I ever met, and he not only promulgated this counsel of perfection, but he lived it to the letter. . . . I shall never forget his judgment and pity when a child wept whose wound was going to be dressed. He stooped down and kissed the little sufferer. Smiles took the place of tears, and all went well. He was a most loveable man. There was a genuine look about him, a naturalness, an entire lack of affectation. He was a true disciple of the Society of Friends all his life, although he joined the Anglican Church on his marriage with Miss Syme. William Ernest Henley strikes him off to the life:



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> ' His wise, rare smile is sweet with certainties
> And seems in all his patients to compel
> A love and faith that failure cannot quell.'

In Henley's ' Hospital Sketches,' originally published in *Cornhill* for 1875, he gives portraits of Lister, Dr. Rice, his house surgeon, Nurse Porter, Nurse Logan, Miss Abercrombie (a visitor), etc. Many of Henley's lines are altered in his collected works, and altered, I think, for the worse. These verses are by far the finest thing in poetry that were ever said of the healing art and its professors."

An incident I can never forget was Lister catching a flea!

A little girl was brought for treatment, undressed, and laid upon the couch; a large flea was seen upon her back.

A merry twinkle crept into his eyes, and he at once assumed the attitude of the hunter; drew back, arched his shoulders, lowered his head, carefully moistened his thumb and middle fingers with the tip of his tongue, pounced upon it, and caught it, and turned to us with a smile of undisguised triumph.

" Rien ne réussit comme le succès ! " I need hardly say it was drowned in 1 in 20!

I do not know why it struck me so forcibly, it was natural and instinctive, but the bathos seemed so great; here was our hero bending all his powers to duelling with a flea!

It was the careful wetting of the fingers that was the point and it spoke the man, and was the carrying out of what he was always saying, that " success depends upon attention to detail."

How often have we not all missed our flea by neglect of this simple measure? Its horny body slips through dry fingers; we all know it, but in the excitement of the moment it is too often forgotten.

However, he was not always victor. He was fond of ice-bags, and one day the lumps of ice being large, and fearing they might cause discomfort to the patient, he turned them into a towel, went to the fire-place and began pounding them with the poker upon the hearth. Mistress Porter heard the smashing from her lair and strode excitedly into the ward to learn what it was about; she was quite unabashed by finding it was the Professor himself who was the culprit, and in broad high-pitched Scotch soundly scolded him for soiling her clean hearth.

Lister desisted at once, and with the quaintest grimace of obsequious submission, literally skipped away. A strange sight indeed, Lister skipping; but it shows he was not devoid of humour in spite of all his seriousness.

Mrs. Porter seized the towel, bore it off, pounded the ice and brought it back in her left hand shaking her right fist vehemently at Lister. I forget what she said, but it was an impassioned rebuke that she would not tolerate such conduct, and that he must mend his ways for the future. He bore it with assumed meekness, and with a triumphant air of vindicated justice she withdrew.

My time in his wards was the most impressive and valuable part of my training; it was all so new and different from what I had seen before or have ever seen since. There was the absorbing interest in the pioneer character of the work, and though our part was humble it was important, as any failure on our side would bring discredit upon the cause.

In London the aim was to enunciate facts, with Lister it was to deduce and instil principles; not parrot knowledge but reasoned insight into perverted function.

Medicine was indeed a tangled skein and some of its problems were unravelling, but the goal and aim, the motive and the impulse, the alpha and omega was neither professional acquirement nor scientific achievement, but the alleviation of suffering. Medicine was no mere learned profession or polite calling; it was a vocation, an endless series of delightful opportunities to help and to heal.

Young and inexperienced as we were, he trusted us; nothing but our best was expected, and it was wonderful how the men responded to his call. It was the magnetism of his personality and the infection of his example—even the hospital porter, a gruff old army veteran, spoke his name in a lower key.

> "Still o'er these scenes my memory wakes
> And fondly broods with miser care,
> Time the impression deeper makes
> As streams their channels deeper wear."

It was the custom of the staff to ask their clerks and dressers to dinner, and Lister followed the rule.

I did not relish the invitation but acceptance was inevitable.

I well remember the evening; we were shy and ill at ease. These duty functions must have been a trial to the professors.

Unfortunately I was placed by Mrs. Lister. It was very good of her to grace the gathering as she must have felt strangely out of touch with her guests.

I remember my attempts at conversation. The weather was soon exhausted, athletics had not then become a cult, for literature we had no time; the drama was unfashionable in Edinburgh, and the highest flight of the imagination could never have associated the Listers

with the theatre. The only thing we had in common was the progress of antiseptics; but in those Victorian days ladies had hardly heard of surgery!

I remember making some inane remarks about the beauties of the Princes Street Gardens and the situation of the city, but felt sadly conscious of their flimsy and threadbare character.

Dear lady! she did her best to bridge the chasm. I cannot recall her face but remember that her features were regular, that she was tall and thin, and that her arms were cased in black net. What strange trivialities impress themselves upon the mind! and why black net should have made such a lasting impression baffles conjecture. It was ordinary and fashionable, but whenever I have thought of her, black net floats into the picture.

The dinner was perfectly correct, verging a little to the side of plainness, as became a Puritan household. There was no smoking, and the wine was partaken of sparingly. In the drawing-room we clustered and chatted in patches, and by ten o'clock were on our way home, and I still feel the delicious freshness and freedom of the night air as the door closed behind us.

I feared Mrs. Lister would have formed so poor an opinion of my social qualities that all chances of preferment were shattered. The self-consciousness of youth is distressing—maybe it has a survival value, and is a temporary self-regulating mechanism which mercifully fades with our blushes. But you may judge of my surprise when three weeks later Lister sent for me, and offered me his house surgency as soon as I had obtained my degree.

CHAPTER XIII

LISTER'S CONTRIBUTIONS TO SURGERY

I AM not qualified to write upon this subject, and can only speak of what seemed new to me, and an advance upon the methods of the day.

It was in his earlier years, before the passion to eradicate sepsis so fully possessed him, that his chief contributions to operative surgery were made.

At the time of which I write he was absorbed in perfecting the technique of antiseptics in wound treatment, rather than in devising new routes for the knife.

I have spoken of his methods of chloroform administration, the open towel and the watching of the breathing, and am convinced they were easier and safer than the Clover's bag, and other pieces of complicated apparatus then in vogue, for I never saw an untoward incident, nor did the administration of an anæsthetic seem to call for particular anxiety beyond an exact adherence to the rules; and for the surgeon to have a safe anæsthetic at his bidding was an incalculable boon.

I hope I do not speak too confidently but can only give my experience. I have never seen a death under chloroform and rarely any anxiety when quiet breathing was the thing that was aimed at, but the profession did not accept his teaching nor do I believe it does to-day, and still seems obsessed with the importance of the pulse,

and will not believe that the respiratory centres are paralysed before the cardiac. We yet hear of deaths under chloroform, and it would be instructive to know whether his rules were followed or ignored.

He had devised an amputation of the thigh, but I never saw it performed. Amputations were common, and damaged limbs were often sacrificed in anticipation of the storm of sepsis that would follow; but Lister saved many of his cases, and this may have been a reason.

With much care and anatomical thought he had devised an operation for excision of the wrist, and used to draw diagrams and explain his method, but I never saw him operate, for tuberculous disease of the joint is far from common. The first original operation that I witnessed, and it followed naturally upon the security that antiseptics afforded, was opening the knee-joint and turning out loose "melon-seed" bodies.

Such a thing in London would have been regarded as unwarrantable, and I shall never forget my surprise when three days after I saw the man sitting up in bed reading the newspaper as though nothing had happened. I had been taught to regard knee-joints as sacred, never to be invaded unless actively suppurating; excisions were common, alas! too common, but then all joint structures were removed and the patient struggled through streams of pus with a protracted convalescence; but here was a man relieved of his trouble without any subsequent inconvenience and rapidly restored to health. Well might Dr. Murchison say: "If I were you I should go to Edinburgh and see the practice of Mr. Lister."

Wiring a fractured patella was another achievement. When one thinks of the old strappings and bandaging, and the surgeon's gratification if there was only half an

inch of separation, and the refusal of his mind to contemplate any subsequent stretching of the fibrous union; but now all was changed. One operation, a few sutures, a bony union, and a fresh lease of leg life! Yet when Lister, in 1883, showed the Medical Society of London seven successful cases of wired patellæ, one of the audience exclaimed: "C'est magnifique, mais ce n'est pas la chirurgie." Of course, the now common practice of wiring fractures is only an extension of Lister's pioneer work.

I have said he was much attached to hydroceles, perhaps because the fluid was peculiarly precious to him as a separated blood content for physiological purposes, and also because Syme had discovered that if the iodine tincture generally injected was much stronger than that usually employed, sufficient inflammation was excited to obliterate the sac and the trouble rarely returned; and he never tired of reiterating it.

Syme's amputation of the foot was another strong point of his; somehow the original incision had come to be disregarded, and the idea was current that the line ran from one malleolus to the other; but Lister insisted upon the fact that it ran from the tip of the external malleolus to the point directly opposite, and therefore well below the internal malleolus; and he said it made all the difference between a good stump and a bad one.

I have alluded to the great importance he attached to careful and complete drainage in order to secure adaptation of the deep surfaces, and of the care he took to select the proper sized drainage tubes; later on he often used gauze drains which were much more adaptable to the tissues.

In all septic cases he relied upon a thorough swabbing

of the part with a solution of 20 grains of chloride of zinc to the ounce of water; he would say it gave the tissues a three-days' freedom from infection, during which they could put up their granulations, Nature's first line of defence.

Allusion has been made to his partiality for the sharp spoon, the removal of outworn barriers, and the call for new ones; and it and the chloride of zinc often did admirably.

He had a passion for conservative surgery, plastic surgery, and skin grafting, and every little bit of periosteum was carefully saved; and if only the evil microbes were excluded much might be preserved and re-organised, and much subsequent deformity prevented.

He was convinced that Nature had ranged herself on the side of the sufferer, and that her efforts were constantly directed to the restoration of health; but through ignorance of her ways and misguided enthusiasm we often thwarted her projects and crossed her purposes.

She was the oldest of practitioners, and the wisest and most experienced of doctors, and for æons had been curing her children and alleviating their woes, but her methods were shrouded, and our practice too often encumbered with officious and ignorant interference.

Could we but sit at her feet, woo her secrets and join hands in her endeavours, what conquests might not be achieved and how greatly the burden of suffering might be lessened.

Instruments he devised

So far as my experience went they were four in number:

An abdominal tourniquet for compressing the

aorta, a large and formidable affair designed for use in amputations at the hip joint, but I never saw it applied though it was figured in the text-books.

Prostatic forceps for extracting stones lodged in that region; these were valuable and are still in use.

Steel-plated bougies, heavy and rigid, graduated from point to base; the idea being that if one could be passed the series might follow, if necessary at one sitting, and they were excellent. He was very good at the urethra, and skilful with strictures, and took much pains to instruct us. He never used force; patience and finesse were his methods based upon anatomical knowledge. He used to say: "No difficult stricture should ever be attempted unless the surgeon felt quite fit and, for example, had had his bowels open that morning. Any little disharmony of his functions might detract from his delicacy of touch and lead to failure." The appearance of blood indicated that too much had been done and a halt must be called. He held that, with few exceptions, "if urine could get out instruments could get in."

But his sinus forceps was the instrument of his design that was chiefly in evidence; the blades were hardly wider than a probe, and he did much probing and fishing about with them. They were invaluable also in inserting small drainage tubes and getting them home, but they needed to be carefully made, and to be rigid and accurately toothed.

Suture buttons for stitches of relaxation large and small, of sheet lead secured by strong silver wire; they act like tips of fingers in approximating the flaps whilst keeping the lips of the wound free from excessive tension.

Chromic acid catgut.

In the Hunterian Museum of the Royal College of Surgeons, thanks to the piety of his nephew, the late Sir Rickman Godlee, a case is devoted to the instruments that Lister devised and often used, and a catalogue has been printed which gives information about them.

Abdominal operations were almost unknown, for surgeons had the greatest dread of opening the peritoneum, and except for strangulated hernia and the recent attempt at ovariotomy, were rarely if ever attempted. To-day they are matters of routine and their achievements phenomenal; before Lister anything but the most occasional success was impossible.

Asepsis is the legitimate child of antiseptics, the substitution of heat for chemicals, a simplification of method only, an old dog with a new collar.

Often he would say " not æsthetic but surgical cleanliness " ; before his day surgical cleanliness was unknown and had never entered the mind. This is his supreme contribution to surgery, to visualise the pestilence that walketh in darkness, and to unmask and defeat the hidden foe.

The modern liners with their ballrooms, winter-gardens, and swimming-baths; floating palaces transporting their thousands, racing like greyhounds across the five-mile deep Atlantic, may well glory in the pride of their achievement; but let them never forget the leathern coracle and how it slowly grew into the *Santa Maria* of Columbus, and that when he had sighted the New World any numskull could follow !

Humbolt said the success of Columbus was " a conquest of reflection," ; and so was Lister's, who discovered for us a new world of surgery.

CHAPTER XIV

HIS INFLUENCE IN THE UNIVERSITY

Of his influence in the official life of the University I can say but little.

The secrets of the Senatus Academicus did not spread beyond the council chamber; its existence was known to us only through the University Calendar and a solemn-looking apartment, hung round with portraits of the illustrious dead, in which it met and into which we only occasionally peeped.

But the general impression was that his professorial brethren were proud of him, and how could it be otherwise considering the world-fame he was achieving, and the flow of savants from foreign universities who came to visit his clinique and study his methods?

Although the greater number of the professors were connected with other faculties they realised that a light had arisen and that a momentous future lay before his researches, and were swayed by an ill-defined conviction of the importance of his work; and it invested him with an interest and a dignity that none of their other colleagues possessed.

One would not think he would be much of a committee man or gifted in debate on academic questions or university politics. He had neither the push nor assertion that success in such matters demands and imports.

We never saw him in company with any of them; he seemed to live and move apart. All great souls lead isolated lives; the qualities that ennoble them separate them from their fellows.

He was not easy of approach, and the instinctive politeness that was so marked a feature of his character invested him with an apartness that restrained familiar access; neither was he Scotch, and the clannishness of the race would hardly care to exert itself to pierce these barriers.

He took no apparent interest in the social life of the University; societies, clubs, and athletic associations had to get on without him. So far as we could judge he seemed completely absorbed in his work.

He had an aversion bordering upon dislike for non-teaching universities, and did not hesitate to express it. A university he considered should be quite other than an Examining Board; it should be a centre of learning and research, where teacher and scholar could work together untrammelled by too rigid a routine or soul-cramping syllabus, and this he showed in his lectures.

To educate in the real sense of the word, to arouse inquiry, develop intellect, and enlarge understanding, to teach how to learn and acquire right method, to induce principles from observation and experiment; these were the things that mattered, and the only training that would equip the student for his life's work. But for a university with its prestige and authority to narrow down to an examining body, and the hall-marking of artificially tutored men, was to stultify opportunity and prostitute prerogative.

The supreme qualification for a medical man was, in his opinion, the stable possession of high moral purpose;

EDINBURGH UNIVERSITY. THE MAIN BUILDING

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without it he might easily become a danger to his patients. How many a sufferer had succumbed to the self-sufficiency or avoidable failure of his medical adviser, and how can this and all that it comprises be learnt from books?

A teaching university offered the best and probably the only opportunity for the acquirement of these endowments, the mingling of trained minds under lengthened discipline in an atmosphere of hallowed traditions bequeathed by the illustrious dead who had sanctified its walls.

He had a poor opinion of examinations. Certainly they were necessary as public safeguards, but to regard them as adequate tests of those qualities that are needed in medical practice was folly. How could self-effacing discharge of duty be tested by examinations?

He firmly held that the teacher should always be one of the examiners; questions might be asked that had not been covered in the course, for how could any course adequately deal with any subject?

The student might fail to do himself justice through nervousness or misunderstanding, and needed a friend who knew him and had watched his work; and a kindly assurance or timely explanation might make all the difference apart from actual knowledge.

He had a great admiration for what was known as the Extra-Mural School; it was a system which enabled the younger men connected with the hospitals to obtain recognition of their lectures for graduation purposes, and Lister himself had begun in this way. It gave choice to the student in the selection of his teacher and kept the university professors up to the mark. It was a source of strength to all and a valuable feature of the

Edinburgh School, and has long been in vogue in most of the continental universities.

The claim of women to enter the medical profession was in those days struggling for acceptance.

An idea so novel and out of harmony with all Victorian sentiments necessarily had a hard fight before it.

All or nearly all of the professors were opposed to it, and the students to a man were rampantly hostile.

The struggle was long and bitter, and the ground as strongly defended as it was courageously attacked.

I forbear to discuss the merits of the movement, but am sure the physiological side of the question has been too largely ignored, and merely record that Lister was mildly inclined to grant them the liberty, and for a strange and almost humorous reason.

Every now and then a case would come to the infirmary for which he felt the best had not been done; a wrong or careless diagnosis, inappropriate treatment, or valuable time lost.

He did not say much, but his grave face and expressive sigh revealed his thoughts, and when the patient had gone he would turn to the class and plaintively say: "Ah! gentlemen, the result of inefficient training."

From many things I gathered he had not a very exalted opinion of the bulk of the profession; he thought its preliminary education was sometimes deficient and its medical training often inadequate, and the thought possessed his mind and would at times pass his lips: "Surely they [the women] can do as well as some of the men," and "Well, gentlemen, if they cannot do better than some of you they will indeed do poorly."

His position was this: the standard by which they will be measured is a low one; if they wish to enter the lists let them have their chance; who and what are we that we should forbid them? But apart from this strangely reasoned acquiescence I am not aware that he took any part in the matter.

What share he took in university government we had no means of knowing, but his influence upon the students was profound.

He was unquestionably the outstanding figure of the medical faculty; other professors were eminent and many of them left their mark upon their work; but Lister towered above them all, original as a discoverer, unique as an inspirer, and supreme as an exemplar.

The loftiness of his ideals, the selfless energy of his life, the modesty and humility of his character, the charm and purity of his nature, and his absorbing concern for the relief of suffering, diffused an influence that has never been forgotten.

And yet these gifts seemed strangely to efface the man, and like the anatomist in Rembrandt's picture "The Anatomy Lesson," the teacher himself faded in the interest he awakened in the subject before him.

His striking personality, embodied in a frame of manly proportions, his beautiful and expressive features suffused with a tenderness and sweetness peculiarly his own, his radiating benevolence and emanating purpose, combined to make him the most arresting and attractive figure I have ever met.

Youth is susceptible to impression; the uncrowded channels of its mind are freely open to suggestion, and if according to Quintilian the supreme qualification for persuasion is "conviction," then in the speechless

eloquence of a devoted life he rose to the zenith of inspiring power.

Whatever the outside world thought of antiseptics the class was convinced to a man; there were no doubters, no waverers, and it was this nucleus of convinced opinion that converted the world.

Knowledge is power, and few have realised it as fully as he; that it is only by the pursuit of science that disease can be vanquished. Some seek her for advancement, some for monetary gain, but he sought her as the ambassador of the sick. His suit has been admirably depicted by Bacon:

> "Knowledge is not a couch for the curious spirit, nor a terrace for the wondering, nor a tower of state for the proud mind, nor a shop for profit and sale, but a storehouse for the Glory of God and endowment of mankind."

The investigator is impelled by a soul of adventure that powerfully appeals to youthful minds. We knew we were treading fresh ground, and it was even coming to be suspected that microbes might also be playing a part in other departments of sickness, and it added zest to the quest. We felt as the sailors of Columbus must have felt when they sighted the New World and dreamt of the possibilities before them.

Strange to say, the two most prominent members of the surgical staff stood aloof from Lister; one apparently unconcerned, and one sceptical and satirical, but they never entered his wards. The junior members of the staff were converts, and worked for the advance of antiseptics. I must especially mention John Chiene, who was Lister's private assistant, and subsequently became Professor of Surgery. He was beloved by all,

and had the charge of the wards during Lister's absence and faithfully followed his methods. A genial, earnest soul, a friend to all, and a painstaking and attractive teacher of whom it might be said, as Marcus Aurelius said of one of his teachers, that "he thanked the gods that he had known him."

CHAPTER XV

APHORISMS AND PRECEPTS

ALTHOUGH many of these have been cited in the foregoing chapters, it is well they should be brought together.

They were often on his lips, and as the class was constantly changing they were reiterated.

I do not suppose they were all original, many of them were "learnt from Mr. Syme," but the bulk of them were new to me; some of them may awaken thought, some of them may revive forgotten teachings, and some of them may suggest new methods, and all of them are worth considering.

"This is one of the many things I learnt from Mr. Syme."

"Success depends upon attention to detail."

"It is the little things that matter and where we so often fail."

"Never be afraid of confessing your mistakes, it is cowardly not to do so and it may prevent others from falling into like error."

"It is the unfortunate property of ignorance that it is ignorant of its own existence."

"Always try and see what Nature is aiming at, and follow her methods and accept her suggestions."

"We are so fond of interfering with Nature; in many cases she would cure the patient if we only gave her time."

"Young surgeons are too fond of the knife; they do not sufficiently realise Nature's resources and her ceaseless efforts to cure the sufferer; much interference might be dispensed with were patience exercised."

"It is better to cure one case than to patch up two."

"Physiology is as important to the surgeon as it is to the physician, perhaps even more so; disease is a living question."

"There is more cruelty in one afternoon of My Lord So-and-So's shooting than there is in the vivisection in this country in the course of a year."

"The preliminary education of the profession is too often deficient."

"Of course, you must pass your examinations, but to work only for that end is unworthy of your calling."

"Examinations are no test of character, which, after all, is the supreme qualification of the medical man."

"Never forget how inadequate is your knowledge, and that you must be students all your life."

"What are we to do for this poor man? It is not what we should answer at an examination, nor is it what the text-books tell us: it is simply what would we ourselves wish were we in his place?"

"There is only one rule; put yourself in the patient's place."

"Every patient that comes under your care should be treated with the same consideration and attention as though he were the Prince of Wales himself, and if you are not willing to practise your profession in this spirit I pray you leave its sacred ranks and betake yourself to some third-class trade."

"Never ask a patient if he has had syphilis; if you know your work there will be no need for you to do so. Has he not done wrong enough already without tempting him to add to his transgressions by telling a lie?"

"If the patient is well enough to have the operation he is well enough to have an anæsthetic."

"Never use any chloroform but the best. Give plenty of it provided you carefully watch the breathing."

"It is the breathing, not the pulse, that must be watched under anæsthetics."

"Quietly and gently put the patient to sleep."

"Never go on with the anæsthetic unless the patient is breathing naturally."

"Keep the head well over to the side, it prevents the tongue slipping back and obstructing the larynx."

"Never apply hot bottles to the patient unless they are covered with flannel, as a patient recovering from anæsthesia, or in a weakly state, may easily be seriously burnt."

"So soon as a patient can articulate a word the danger of the anæsthetic is over."

"Never attempt a difficult case, such, for example, as the passage of a difficult stricture, unless you feel quite well in

yourself; unless, for example, you have had your bowels open in the morning; any little disability in your condition may make all the difference between success and failure."

"Anæsthetics have abolished the need for operative speed, they allow time for careful procedure."

"Knives that do not carry a sharp edge bruise the tissues and retard healing."

"If you are going to have healing by first intention you must have accurate apposition of surfaces."

"Drainage of surfaces is essential, it promotes approximation of deep structures and prevents undesirable absorption."

"As far as possible splint your wounds, the less movement a wound has the better."

"Be sure the patient is quite comfortable before you leave him; any strain disturbs his whole system, retards healing, and may rob him of a night's rest."

"After an operation go over the whole matter in your mind, and see whether next time you cannot do it better."

"It is not æsthetic cleanliness we need but surgical cleanliness, a very different matter."

"For a surgeon to introduce septic organisms into a wound is for him to be as guilty as though he plunged his scalpel into the patient's carotid."

"Asepsis in this imperfect world is not to be trusted, human carelessness and fallibility are common; it is safer to have an antiseptic; properly used it can do no harm and may make all the difference."

"Sepsis is a question of dosage, the living tissues can deal with a few micro-organisms."

"Carbolic acid is in itself an evil, and is harmful to the tissues, and the more we minimise its action the better; we need it to fight the invaders not destroy the defenders."

"Carbolic acid penetrates grease."

"Perchloride of mercury is the strongest antiseptic known, but it coagulates the tissues and does not penetrate grease."

"A swabbing with a watery solution of chloride of zinc, 20 grains to the ounce, will in septic cases give the tissues three days' rest from organisms."

"All along surgeons have been unconsciously practising antiseptics, for are not linseed poultices made with boiling water, and caustic, sulphide of copper, zinc, and mercury salts all antiseptics?"

"There is no such thing as a 'healing ointment'; Nature is the healer, and all we can do is to place her under the best conditions."

"Never peel off a sticking dressing; soak it off no matter

how long it takes you; otherwise you may destroy days of epithelial healing."

"Always cleanse a wound away from the centre, never to it, as otherwise you will sweep in dirt."

"Black safety-pins are better than white ones; they are more easily seen."

"Safety-pins should be placed parallel to the line of strain, not across it, or they may tear through the bandages or buckle."

"The contraction of scar-tissue is invaluable, it helps to close a wound; a good servant but a bad master, watch it and curb it of excesses."

"Fractures of the arm, and especially of the leg, are treated better if the splints are fixed with three or four loops of bandage rather than with the continuous roller; the seat of the fracture is under observation and defective position can easier be rectified, the air can get to the part and the blood supply is better."

"Surgeons should not shun ulcers of the legs; they cause immense discomfort; and with rest, blisters, edge-paring, and skin-grafting wonders can be done."

"The reason why iodine injection not infrequently fails to cure a hydrocele is because the tincture is not strong enough to excite sufficient inflammation to obliterate the sac; a stronger solution will do this."

"Mr. Syme used to say: 'If rhubarb and soda will not do a patient good, nothing will.'"

CHAPTER XVI

LISTER IN LONDON

In February, 1877, Sir William Fergusson died. For over thirty years he had been Professor of Surgery at King's College, London, and was one of the leaders of the profession; he was a brilliant operator, and had attained a world-wide reputation.

The authorities of King's College were naturally anxious to maintain the reputation of their school, and in the choice of a successor they turned to Lister, who was offered the appointment, and after serious consideration accepted it.

It was a severe wrench to sever his connection with Edinburgh with all its hallowed associations, and its enthusiastic class of nearly four hundred students, and exchange it for one of the smaller London hospitals with a medical school of only one-seventh the size. At King's he was to have only twenty-four beds whilst at Edinburgh he had sixty.

But as Sir Rickman Godlee says in his admirably complete biography of his uncle: "There was a stronger, indeed an overpowering, argument in favour of the move. Lister was now a man with a mission; the antiseptic doctrine had been accepted in every part of the world that counted except London, where it had made but little headway, and the importance of con-

verting the greatest centre of learning and medical education in England justified almost any sacrifice, and it seemed as if the only way of convincing Londoners was to let them see how he actually carried out the treatment himself, and the results he was able to obtain."

So he accepted the call in a true missionary spirit to carry the antiseptic gospel to the capital of the empire; he felt it was his duty and repressed all personal considerations.

The students of Edinburgh were dismayed at the news and got up a monster petition imploring him to remain, but the claims of a wider humanity prevailed; the larger sphere that London afforded to demonstrate his methods to a still sceptical profession.

A few days after he arrived in London he wrote and asked me to call upon him at his hotel in Wimpole Street; he was house-hunting, and full of thought over the details of the work in his new sphere.

He realised the responsibility that lay upon him, and that there must be no possibility of failure. It would be months before he could train a new set of clerks and dressers, so he turned to some of his old hands for the start, as he must have the assistance of men who knew the technique of the work. The eyes of London would be upon him and a breakdown would be disastrous.

After some difficulty he had persuaded the authorities at King's College to permit him to introduce the system of surgical clerkship so long in vogue in Edinburgh. Had he remained in Edinburgh I should then have been his house surgeon, so he offered me a clerkship.

After chatting with Mrs. Lister (who still had a trace of black net about her!) we walked down Wimpole

Street. He was anxious and thoughtful, and stammered rather more than usual as he discussed his arrangements; his whiskers were now iron-grey, and the soles of his boots I noticed were as substantial as ever! His fine black coat and nicely glossed silk hat suitably framed the picture of a mature and well-found English gentleman. He appeared more than ever attractive; care had further chiselled his expressive features; but it seemed surprisingly strange to be discussing the plans of his work and to be talking to him with ordinary freedom, and I felt very sensible of the honour. We parted at the end of Wigmore Street, and I promised to consider the matter.

Somehow I did not quite fancy the work: the old routine of lotions and dressings and sprays, the familiar ground again covered; also I wanted to visit the continental schools and study their specialities, so after a few days I wrote and declined his offer, and started for Vienna.

When he learnt my decision he most kindly offered to give me introductions to the professors he knew at Berlin and Vienna, hoped I was "doing the right thing," and wished me all success. He wrote me four letters which I shall ever appreciate, and I can never forget his kindly solicitude for my welfare.

The removal of his antiseptic treasures to London was a serious and perplexing problem, particularly those three flasks of boiled urine of which I have spoken; they were the sheet-anchors of his creed in support of biogenesis, and though they were ten or possibly twelve years old they still remained free from putrefaction; they were to convince and convert London as they had convinced thousands in Edinburgh; but how their

transport was safely to be effected was a problem indeed!

He told me the only method he could devise was to carry them upon his knees; so for four hundred miles he and Mrs. Lister journeyed in a specially reserved first-class carriage bearing these strange treasures upon their laps, their attention riveted to every jog and jostle to counteract each serious shake or menacing splash. Those who have made the long journey under ordinary circumstances know how wearying it is, but to have it augmented by unremitting attention upon three vibrating flasks of epoch-making fluid for ten consecutive hours is a feat of endurance few could have achieved. If genius is a capacity for painstaking, as Buffon has said, "Le génie n'est qu'une plus grande aptitude à la patience," or as Edison has insisted: "Two per cent. of inspiration and ninety-eight per cent. of perspiration," then Lister fulfils the conditions. However, they survived, and biogenesis survives them all.

He chose for his London home No. 12, Park Crescent, within a stone's throw of Regent's Park; doubtless its beautiful glades, superb show of summer flowers, and perhaps also its Botanic Garden appealed to him, for he loved Nature and botany attracted him. It was not a strictly professional residence, but Harley Street was near and Lister never posed as a fashionable doctor, and ostentation was to him distasteful; so a good substantial, centrally situated, semi-classical house met his needs.

I visited it on three occasions, and the house still bespoke the man; the same solemn, substantial Victorian furniture bearing its accustomed polish; everything seemed on duty. It is strange how our dwellings

bespeak ourselves, and unconsciously to us deepen the characteristics of our personalities.

His reception at King's College was cold in the extreme. At his introductory lecture the students were bored, and after the uncouth manners of the times actually shuffled their feet to evidence their impatience; it seems incredible but it is true.*

I went from time to time to King's College Hospital, but it saddened me; all was so different, the crowd of students had vanished and was replaced by a mere handful, a dozen or even less at his lectures, and most of these his clerks and dressers; the foreigners had nearly disappeared, they had learnt in Edinburgh, and now in their own countries were practising his methods. Lister never taught for exams., and the King's men were literally overwhelmed by the College of Surgeons, the back of whose buildings was across the street; they were absorbed in their routine work, and had little interest for that which they doubtless regarded as a freak.

It must have been a sad contrast to him, the apathy and indifference; he was no longer revered as the founder of a new system that was to revolutionise surgery, but was regarded as a crank who was crazed upon exploiting a method that the acknowledged heads of the profession rejected.

He was pained also at the indifference of the hospital surgeons of the metropolis, who paid him scant attention, being too stereotyped to come and learn, *ab initio*, the method of dressing a wound; they did not question his successes but explained them away by his punctilious

* For some interesting details of Lister's life at King's College Hospital in this chapter I am indebted to Sir St. Clair Thompson's "Coming of Lister to London," St. Bartholomew's Hospital *Journal*, January, 1921.

attention to dressings and drainage. It was, as he said, "a humiliating experience."

Some years before, London had tried what it considered was his antiseptic treatment, and understanding nothing of its principles had grasped but one factor, carbolic acid; and this, through utter misconception of its function, had naturally failed them. They still used it as a disinfectant to mop up the mess, but to regard it as an averter of the evils was negatived by their experience, as it had miserably failed them in their misguided practice.

So Lister went his rounds with a few students, and lectured to nearly empty benches; and England, the land that bred him, and London, the school that reared him, slumbered on, and had to be awakened from America and Germany; they had grasped what she had missed, and the tide that was destined to swamp the fœtid marshes of sepsis set in from distant lands.

The nurses, too, conspired against him. The hospital was nursed by the St. John's sisters, a rigid and meticulous Anglican Order, who thought the end-all and be-all of their mission was for the patients to have shining faces, smooth bedclothes, tidy lockers, and to say their prayers often.

They resented the extra work antiseptics gave them, the endless washings of basins and mackintoshes. He gave them more work than any of the surgeons and they never knew when he was coming, as he had the audacity to drop in sometimes after dinner or even on a Sunday if any case was causing him special anxiety.

The repressions, rigidities, self-constituted rules, and general exaltation of what they considered the religious cares of the sick above the material needs of

surgical technique rendered them unpleasant and overbearing colleagues, if not actually dangerous assistants.

After much friction and unpleasantness they withdrew, or were dismissed, to the relief of all parties, and the nursing reverted into common-sense and serviceable channels.

The hostility to antiseptics was extraordinary. In the winter of 1876–77 I was house physician at my old hospital, St. Thomas's; we residents dined together in the College House, and whenever the conversation flagged it could always be revived by an allusion to antiseptics.

One of the residents, who subsequently became full surgeon to the hospital, loved to lead the attack. One day the serving man was handing me some melted butter, and was loudly and imperiously questioned as to whether the sauce contained its quantum of carbolic acid. He looked confused and confounded, and was sternly ordered away with the dangerous liquid lest the life of a "Lister man" should be endangered! The joke would be varied from time to time, and always with hilarious merriment.

One of the surgeons to Bartholomew's Hospital could always raise an appreciative laugh by telling any one who came into the operating room to shut the door *quickly* lest one of Mr. Lister's microbes should come in; and a famous London surgeon was fond of remarking that the so-called "antiseptic" treatment was simply substituting one bad smell for another bad smell!

The current attempts at antiseptics were curious. Callender of St. Bartholomew's posed as a disciple. I remember him opening a large psoas abscess, evacuating its contents, hyperdistending it with strong carbolic

lotion, closing the wound, and confidently expecting that cure would follow; he firmly believed that he was practising antiseptic surgery! To us it seems grotesque, but it was a sample of how Lister was misunderstood; truly, a man's foes are often those of his own household!

I have alluded to the students' indifference, his colleagues' contempt, and London's callous neglect, and it must have been an eye-opener when two years later he received a perfectly unique reception at the International Congress of Medicine at Amsterdam. "The whole assembly rose to its feet, and with deafening and repeated rounds of cheers, waving hats and handkerchiefs, renewed minute after minute and time after time; his name was again and again shouted."

But the older men were passing away and the younger surgeons were gradually adopting the new method; bacteriology was growing and abiogenesis was dying. Tyndall had given it its death-blow by his epoch-making experiments at the Royal Institution, and the profession was beginning to wonder whether, after all, there might not be a pestilence that walked in darkness.

Such a revolution in thought needed time; men's minds work slowly, and the whole subject of micro-organisms was regarded more as a matter for curious specialists than of value for practical use.

It has always been so. Socrates was done to death, Galileo was tortured, Harvey lost most of his practice when he discovered the circulation of the blood! True, there may be, as Burke has eloquently said, "a virtue inherent in old prejudices"; but that should never be said of Science; her revelations should compel adjustments; happy is the mind that is open to the

reception of new truths and plastic enough to obey their teachings. Let us learn from the past; innumerable problems lie around us, the mysteries of disease are only too often increased by knowledge, but biochemistry is but a babe the power of whose manhood has yet to be felt. It is only the Lister spirit of sympathy with suffering engendering research, undaunted by difficulty, undismayed by failure, unaffected by dispraise, that will make us worthy of being his disciples and capable of carrying on his work.

Even in Lister's London days things were very primitive; there was little washing of hands, little soap and water, either for the surgeon or patient, before an operation. The theatre sister was dressed in serge, the nurses wore long sleeves, the surgeons and dressers their ordinary coats. No merely aseptic measures would have had a chance in such a welter of contamination; an antiseptic,and a powerful one, too, was needed, and carbolic acid met the case. True, the results were brilliant, and convalescence was rapid; pus was declining and " stitch abscesses " hardly in evidence; but gradually washing and boiling supervened, and heat began to do in less virulent ways that which crude carbolic acid had begun. The spray was discarded, 1 in 40 superseded 1 in 20, the surgeon's hands grew smoother, and the practice of antiseptics less onerous; heat sterilisation was advancing and details were modifying. It was like the old-fashioned dissolving views, the first picture was fading into a second; there was more preparation before the operation, sterilisers were multiplying, and elaborate hospital plants were being installed. The younger men were eager and inquiring, the elder irritated and annoyed. I once heard an eminent surgeon de-

nounce the whole business as "a lot of damned nonsense!"

With the appearance of the "Nightingales," Mrs. Gamp's black stuff garments, which Dickens so faithfully described, were replaced by light washable print dresses, a gain of no small importance to the sick, both from a hygienic and æsthetic standpoint.

The zeal for uncontaminating clothing intensified, and the most advanced and up-to-date nurses were beginning to discard their sleeves at operations, and work with bare arms.

It is curious how the eternal feminine pervades even the dry light of science, for it was obvious that bare arms for a long time found favour with those only whom Nature had endowed with elegance of limb, their less gifted sisters clinging tenaciously as long as they dared to the old fashion. (It will be a happier day for us when we realise the sway of the hormones, we shall understand, and accept much that now befogs and troubles us!)

* * * *

But the long night was ending, and light was breaking over distant hills.

Poor Lister was lost at King's; his class was small, the foreigners were few, and surgical London was apathetic; but the seed he had sown and scattered widely in Edinburgh had sprung up, and was bearing fruit in distant lands.

Germany was enthusiastic, Canada and America had grasped and accepted his message, and surgeons the world over were realising by happy experience that antiseptics had passed from theory into established truth, and it was only by this chorus that England was awakened and roused to endeavour and responsibility.

Slowly the change came, but the pace quickened, and in a few years the land of his birth accepted from foreign lips that which it had ignored from his own.

It is astonishing to recall how slowly the great induction spread to other departments of medicine, for it was years before the rôle of micro-organisms was sought and found in other branches of illness.

There is a story of an old Scotch sexton who for forty years had served the minister in the combined offices of sexton, verger, gardener, and coachman. One day a neighbour archly said: "Well, Jock, you have been so long with the minister I dare say you could preach a sermon as well as the minister himself." Jock hung his head and cautiously replied: "I dinna think I could preach a sermon, but maybe I could draw an inference!" And he possessed a faculty that is strangely rare. Induction is the latest acquirement of mental evolution, and few there be that find it!

Surgical sepsis was becoming a declining quantity, pyæmia was vanishing, and yet puerperal fever and septicæmia stalked unchallenged through the land; their death-roll or long subsequent disablement were appalling! Yet no one "drew an inference"! It did not occur to the obstetric mind that breaches of surface were as liable to infection as breaches of skin! The wail of woe still rose from many a motherless family; but now thousands of mothers are living who, but for Lister, would have mingled with the dust. The relief was long in coming, but at last the obstetricians realised the truth that: "The fault, dear Brutus, is not in our stars but in ourselves!"

Medicine slowly followed. Pathologists were beginning to hunt for microbes, the dawn was growing into

clear shining. Bacteriology was becoming a science and fresh infections were added to the list.

When one looks at the array of drugs that crowd the druggist's shelves one wonders how many, or rather how few, will be there in fifty years' time? Pills and potions so confidently prescribed for ages and so faithfully swallowed will diminish, and serums and vaccines will take their place.

The inference extended to public health, and the "dirt diseases" of John Simon were gradually traced to their organic sources, and who shall assign a limit to the quest?

When one looks back on the long-drawn-out advance, that first aphorism of Hippocrates seems more than ever true: "The Art is long, experience fallacious, and judgment difficult."

In his lectures at King's College, whenever I attended, he rarely failed to utter a caveat against relying wholly upon asepsis, and this was a feature of his later life.

He realised to the full the benumbing effects of antiseptics, and was keenly alive to the fact that they inhibited the defensive action of the tissues.

He strove to reduce their strength and limit their action, but he knew the fallibility of human nature, its omissions and commissions, and experience taught him that even some of his own cases, even in spite of antiseptics, had sometimes suffered; and therefore in this imperfect world he urged the employment of some antiseptic, and that reliance should not be placed upon ideal conditions, which rarely exist. "Anyhow it is safer," he would say, and "if properly used they can do little harm and may in some cases make all the difference."

In spite of what was said I am sure he welcomed the spread of general asepsis: how could it be otherwise? The less the chance of contamination the better, but we do not live in Utopia, and in general practice asepsis is unobtainable. The highly trained staff and expensively equipped apparatus of a modern hospital are available only for the few, and the surgeon will strain his eyes for many a year before he sights the Delectable Country where doctors can work under perfect aseptic conditions.

One day he came to St. Thomas's. One of the large operating theatres had been divided into two, and everything that skill could suggest had been done in the way of fittings and refinements to bring the theatre up-to-date: glazed tiles, enamel plate, and impervious floors, vied with each other in obtrusive cleanliness. He had been asked to inspect the theatres and give them a blessing.

He was much interested in the inventions and ingenuities the architects, decorators, and surgical appliance firms had devised, but I noticed a guarded and almost artificial expression of approval, and I gathered from the few words he said that he questioned whether adequate value had been obtained for the cost expended, and that in elaborating the casket there might be a danger of undervaluing the jewel.

His growing disregard of "entourage," to use his own favourite expression, had led him to abandon his treasured spray, for he felt with increasing conviction that it was the surgeon himself who was the contaminator, and that as far as sepsis or non-sepsis at an operation was concerned it was upon the table that the patient's fate was decided; the introduction of an unpurified hand, sponge, or instrument outweighed a

thousand times the benefits of an enamelled wall or marble floor. He wanted things to be seen in their true perspective, lest whilst the surgeon was straining at gnats he might be swallowing camels.

Were entourage the transcendent factor that the rising school considered it to be, antiseptic surgery could never have survived in the old Edinburgh Royal Infirmary; asepsis was all to the good, and the more we had of it the better, so long as the surgeon did not rely upon it to the neglect of his own personal responsibility; it was a beneficent ally, and to profit by it was one thing but to rely upon it another.

The crowning work of his life at King's was the working out and perfecting of the "double cyanide gauze."

He told me that when he had devised an efficient and non-irritating dressing he should retire from active work.

Like everything it was an evolution, here a little and there a little, trial and error; we knew his patience and ingenuity and chemical efficiency, and the little roll of pink gauze completed his life's work. It solved the problem he had set out to reach, met the case and could be trusted, and he sheathed his sword.

* * * *

It is Miocene days. The Alps and the Andes are yet unborn, they are slumbering in the womb of time. In Middle Asia man is emerging from lower forms; it is two million years ago; hunger and love dominate his life, and wounds shorten it, for he knows not how to treat them.

The earth turns more slowly. Man has radiated afar; Java, Piltdown, Neanderthal, Cromagnon, and Rhodesia sustain him; he is urged by the same impulses and revolves the same problems.

Civilisation is born. The wonders of Egypt, the Arts of Greece, the powers of Rome culminate and decline, but the problem is still unsolved.

The night of the Middle Ages falls, but the Renaissance dawns. Copernicus, Galileo, and Kepler flare upon it; Bacon and Descartes remodel thought; Vesalius, Harvey, and Malpighi are at work, but no one is nearer the solution.

Science bursts into flame: chemistry, physics, and physiology advance, steam is harnessed, oceans are bridged, electricity is saddled, the nature and distance of the stars are known, and surgery develops undreamt-of dexterity, but its chariot-wheels are tethered by the Gordian knot of sepsis, and no one can loose the bands.

The doctor distributes death in healing, the birth of the child is the death of the mother, the pestilence that walketh in darkness meets man at every turn, he groans under its burden, his grave-yards are too narrow. Two million years have passed and things are worse rather than better; civilisation has multiplied his ills and halved his resistance; the wisdom of the world has failed, for:

> "There the antick sits,
> . . . and with a little pin
> Bores through his castle wall, and farewell king!"

On April 5, 1827, Joseph Lister is born.

* * * *

The last time I saw him was in the Greenhouse at Kew Gardens on a Sunday afternoon.

He had always been attached to botany, and had been a pupil of Lindley; it was a relaxation to him, and he felt it held secrets of the problems and riddles of life could we but unravel them!

There he stood, a noble and arresting figure, absorbed in the contemplation of a flower. He recognised me at once and greeted me with the old familiar smile. Our conversation soon turned to antiseptics. A case had recently come under my notice where a gardener had fallen through a greenhouse roof and lacerated his arms. The surgeon who treated him was keen on antiseptics, but having none with him, and thinking that in the emergency a strong and healthy man cut only with glass might at a pinch dispense with antiseptics, stitched up the wounds in the then ordinary way; in a week the man was dead of acute sepsis!

Lister was visibly affected, the old pensive look appeared, his head dropped to the side, he heaved a sigh, and mournfully said: "Ah! when will they learn? I fear it will be a long time yet."

But Lister lived to see his triumphs. Before the shadows closed upon him he was privileged to see victory all along the line.

Foreigners had long accepted his teachings and realised the incalculable value of his work; their hospitals had adopted his methods and their universities had showered their degrees upon him, and Great Britain was following in their wake and was at last converted. Antiseptics were not merely tolerated, they were extolled and had become the essential factor in operative work.

The old opponents had passed away, and young and eager minds vied each other in the completeness of their methods.

The spray had disappeared; carbolic was giving place to heat for sterilising instruments and dressings, and asepsis was superseding antiseptics in operation cases, but the principles were the same; micro-organisms

were the admitted foe and the methods of attack were varying with extending knowledge.

Immense care was being bestowed upon the operating theatre: surgeons and assistants wore sterilised coats; hands were purified with chemical soaps; nurses appeared in sleeveless dresses, and the ritual of an operation rose to unimagined heights.

Contrasted with Edinburgh days it was a transformation scene! The grain of mustard seed had grown to unsuspected proportions!

All this Lister was privileged to see. The world had not only accepted his teachings but was enthusiastically elaborating them.

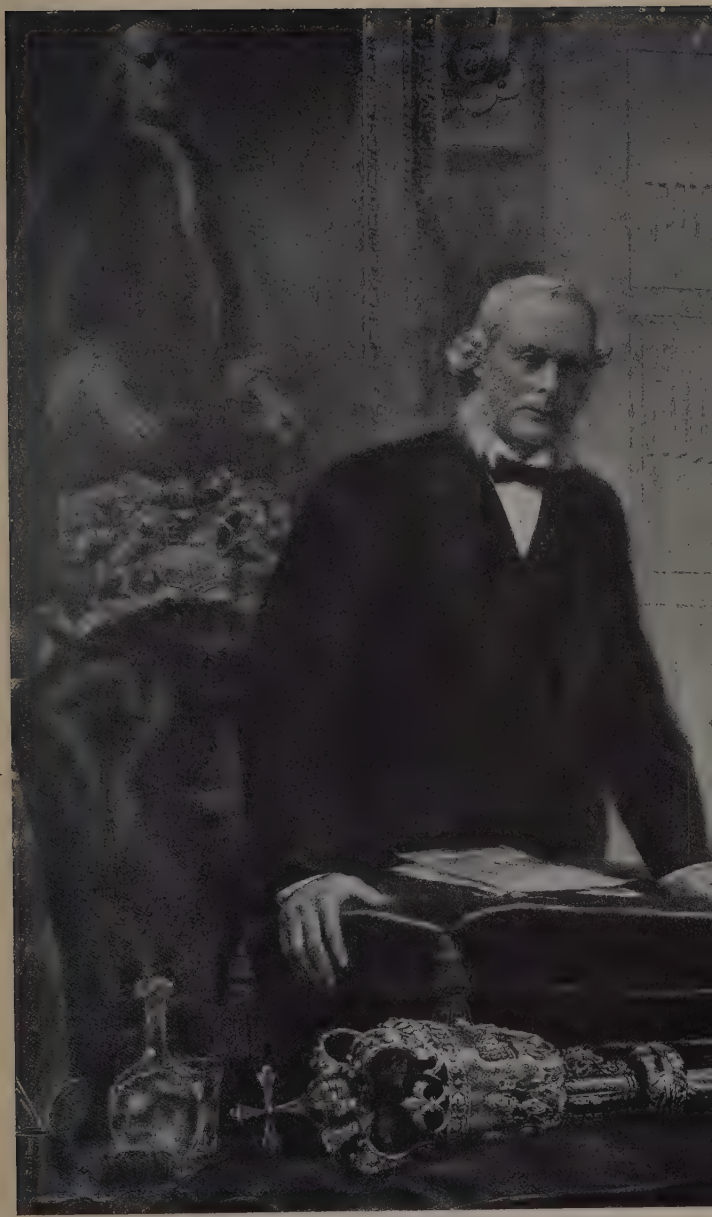
His sun was setting in glory, and with a splendour he could never have conceived; the thunders of controversy had ceased, the lightning of criticism had faded, and the evening of his life was suffused with the radiance of world-wide success.

It is granted to few reformers to see the fruits of their labours; usually it is left to posterity to recognise their worth and raise monuments to their honour.

Full of years, full of honours, and conscious of the inestimable benefit he had bestowed upon mankind, the evening of his life closed upon him.

One of the last acts of his semi-professional life was one of great personal kindness. My proposer for the Athenæum had died, and I asked him if he would graciously take his place.

He was confined then to bed, but I did not know it. He at once responded to my request and drove down to the Club on Sunday afternoon. He was too weak to leave his carriage, and the book of the candidates had to be brought down to him; he signed the proposal



SIR JOSEPH LISTER AS PRESIDENT OF THE ROYAL SOCIETY, 189
(*From Prof. Chiene's "Looking Backwards"*)

and drove back to bed. It was a touching record of his solicitude for an old pupil. When the ballot came a few years later he took the trouble to attend and personally canvass for me.

An eminent member of the Club said to me he would rather be proposed by Lister than by any one on earth.

Of his latter life I can say but little, and what I learnt was gathered from the newspapers and occasional chats with some who knew him.

In 1893 he retired from King's College, and Lady Lister died on one of their tours abroad. She had been his devoted companion and had entered into all his work, clerical and scientific; they were inseparable companions and he never recovered from her loss.

In 1895 he was elected President of the Royal Society.

In 1896 he was President of the British Association for the Advancement of Science, and gave an address upon antiseptic surgery.

In 1897, at Queen Victoria's second Jubilee, he was raised to the peerage.

The next few years were notable for the numerous recognitions he received from learned and public bodies, who vied with each other in bestowing honours upon him; but his health was declining and his activities lessened.

In 1903 a slight "seizure" fell upon him from which he never fully recovered.

In 1908 he went to stay at Walmer in Kent with his sister-in-law, Miss Syme. He benefited from its bracing air and enjoyed the pleasant country, but his powers were waning and he never returned.

A friend who was in the habit of visiting Walmer told

me he was frequently to be seen sitting upon the balcony, gazing out to sea.

What is there in the sea that so fascinates us? We all feel it, the spell of the shore and the call of the running tide.

Perhaps beyond the horizon he would think of the millions who were benefiting by his labours, and to whom the ever-passing ships were hastening. Perhaps its sorrow-soothing shore alleviated the loneliness of his widowered life and solitary days.

> "As here I sit and watch thee
> In thy moods of endless change,
> Mirthful moods of morning gladness,
> Musing moods of sunset sadness,
> When the dying winds caress thee
> And the sinking sunbeams kiss thee
> And the crimson cloudlets press thee
> And all nature seems to bless thee."

Would he not meditate upon its grandeur and revere its sublimity! Would it not be a tireless companion in its changing fancies? Perhaps he would think of it as a realm of balanced antiseptics that had solved the problems he so long had pondered!

I like to think upon the scene, Lister gazing out to sea, the limitless, the eternal; the quiet and the rest.

> "Sunset and evening star
> * * *
> Twilight and evening bell!"

Increasing weakness denied him the visits of his friends; the infirmities of age were closing upon him, and the tide of life ebbed peacefully away on February 10, 1912, at the ripe age of eighty-four.

It was generally expected he would be buried in

Westminster Abbey, and much disappointment was felt when it was known he had explicitly directed that he should rest with his wife; but it was a relief when it was announced he was to have a public funeral in the Abbey.

It was a never-to-be-forgotten scene. Representatives from universities and learned societies filled the choir; but what was particularly noticeable was the number of nurses who were present, and the many who, from their appearance, looked as though they might have been former hospital patients.

The vast assembly waited in solemn silence, wrapt in the memory of his sweet personality, and of the priceless benefits he had bestowed upon mankind.

A faint echo of increasing force told us the cortège had left the little Chapel of St. Faith, where the body had rested overnight.

Slowly the coffin entered the choir in the grey light of the February morning through that mysterious atmosphere which always pervades the Abbey and seems to bear such silent witness to the sorrows of our race, a fitting symbol of the veil through which the light of knowledge has slowly struggled, and which he and its chosen dead had done so much to penetrate.

Yet none of us could think of him as dead, but rather that his work was but beginning, and that the tree of life which he had planted would bear twelve manner of fruits yielding her fruit every month, whose leaves would be for the healing of the nations.

There was hardly a soul in that vast assembly who did not feel a sense of wrong when his body was borne to Highgate cemetery; we felt it belonged to us and should have been enshrined in the Valhalla of fame, preserved in the nation's keeping.

Over one of the portals of Rouen Cathedral there is a bas-relief of the burial of St. John the Divine.

The heart-broken disciples are lowering the body into the tomb. The legend runs that it imperceptibly faded away, and that clouds of incense ever after arose from the shrine.

Only a medallion in the North Transept perpetuates his memory; it does him scant justice and poorly depicts his beautiful face and unique personality, and will convey to posterity a very inadequate conception of him. It is heavy, wanting in interest, and devoid of the sweetness and charm that were such an outstanding feature of his character.

The bust in the Royal College of Surgeons is bad also; it is wooden and void of that expression of sympathy which was the mainspring of his life, and I never look on either but with regret. They have missed both the man and his message.

The monument in Portland Place is strangely unreal. The pedestal is admirable andcould hardly be bettered, but the bust might be any one, an industrial magnate or a successful City man; it has a sharpness of feature that savours of the mart rather than of the ward. It is not Lister!

It would have been better had these memorials simply recorded his triumphs rather than attempted to depict his wondrous features; the mantle of Phideas and Praxiteles has not fallen upon the twentieth century.

By far the best portrait is that by J. H. Lorimer, in 1905, in the Upper Library of the University of Edinburgh. It is placed looking down the long avenue of busts of former illustrious professors, and if the end of knowledge is the endowment of mankind, no one better deserves the position.

CHAPTER XVII

FIFTY YEARS AFTER

It is a new world, and the more we contrast it with that of our parents the more we realise the fact.

The revelations of bacteriology have affected every department of life; we see things in new settings and orient our lives accordingly. In public and in private we wrestle with the foe; civilization is transformed! Sir Frederick Treves has said: "It is a question if any change in human affairs or any disturbance in human creeds has ever been so striking, thorough, and unexpected as this."

The review that follows skims but the surface; it might be extended indefinitely, but the aggregate is enormous. What the future will disclose passes conjecture!

As soon as the babe is born its eyes are bathed with antiseptics, and the curse of life-long blindness is eliminated from many; its umbilical cord is swathed in antiseptic gauze; it is vaccinated under antiseptic precautions, and the bogies of the antivaccinators are shattered. Should its mother's milk fail, clean milk only should be given, and were this followed the lives of thousands of infants who now die yearly from summer diarrhœa would be saved, to say nothing of almost banishing spinal, hip, and knee-joint caries, and glandular

abscesses, the result of tuberculous infection from the cow.

Sunlight is known to be a bath of antiseptics, and the blinds and curtains with which our ancestors excluded its beneficent rays are happily disappearing. Light-treatment is teeming with possibilities; the smoke-cloud that now darkens our cities will disappear, and so will underground dwellings. Streets are widened; open spaces are provided, and fresh air has become a cult. The city's dust is recognised as a deadly foe, bearing as it does upon its motes the lethal microbe. Ventilation is becoming an art.

Our food supplies are reorganised. Drinking water is accepted or rejected according to its bacteriological content. Yeast is known to have its diseases, and only healthy strains can be profitably used for baking and brewing. The greater part of our meat and fish reaches us from distant parts in icy chambers, inimical to germ life. Tinning, canning, and bottling are universal. Milk is getting cleaner though its disease-conveying powers are still prodigious. Almost everything we take is expected to conform to standards of germinal purity.

The microbe is known to be the child's deadliest enemy, and epidemics are no longer regarded as inevitable.

Contrast the happy, healthy, wind-swept, sun-washed scout of to-day, with his muffled and coddled grandparents!

The workshop and factory are transformed: light, air, and sanitation are statutory, and occupation diseases are declining.

Agriculture and stock-rearing are new sciences, and

it is doubtful if there is a single industry that has not been modified.

Public health is an important if not *the* most important department of the State, and its myriad workers stalk the microbe incessantly. Bacteriological laboratories are world-wide.

Draining and scavenging are compulsory; flies are hunted and their disease-conveying powers limited; and town-planning has arisen.

Sanatoria and isolation hospitals are part of the municipal routine. The consumptive may not spit indiscriminately; and the convalescent typhoid and diphtheritic are shadowed lest they be carriers of the disease.

Every port keeps its sanitary vigil to fend off foreign microbes; and the very railway sleepers upon which we travel are steeped in antiseptics!

The horrors of war are mitigated beyond belief: millions of men can now be kept under arms and in health through the agency of bacteriology; typhoid is averted; drinking-water, that problem of armies, is boiled or chlorinated, and it is no exaggeration to say that millions of lives have been saved, operations performed, and reparations effected which, but for Lister, would have been impossible.

Strangest of all, the closing stages of the awful War were won by microbes.

Cordite, that indispensable explosive, is manufactured with acetone, and acetone was eventually produced in unstinted quantities by microbes. I shall never forget the feeling of awe with which I gazed into a vast cement fermenting vat as large as a three-storied house—it was the autumn of 1918 when the drama

was closing—there were the microbes leading the last charge, the " Up, Guards, and at 'em ! "

Our outlook on the animal world is altered: they are known to suffer from microbic disease like their monarch, man. Veterinary medicine and surgery are transformed; epidemics in flocks and herds are diminishing, and will be eliminated with serums and vaccines. The vegetal kingdom follows, bacteria and fungi are known to wield despotic sway over acres and forests; the orchard receives its antiseptic sprays, and a census of the invisible flora of the soil is a daily routine in agricultural colleges. New possibilities are opening before the farmer, who must either learn from the bacteriologist or fail.

Hospitals are transformed; the awful evils of hospitalism have disappeared. Hospital gangrene is unknown, pyæmia is rare, and septicæmia infrequent; pus is a declining quantity and in non-suppurating operations a disgrace; a bacteriological department is an essential for hospitals. The pre-Listerian hospital, which was but too often the road to death, is now the highway to health; the majority of the patients in the surgical wards are cheerful and happy, their appetites are good, and their temperatures normal.

Surgery is a new science. Before Lister one out of every three or four patients died after major operations; it is now from two to three per cent.; the mortality of surgery is now, according to Sir Berkeley Moynihan, almost entirely a mortality of delay. Before Lister, surgery was largely confined to the extremities; it now exercises its beneficent sway over every region of the body; every cavity is fearlessly explored.

Brain, spine, eyes, ears, nose, throat, and teeth yield

harvests to antiseptics, and these guardians of our life are restored to their rightful service. The pleuræ are drained, the heart is sutured, the abdomen re-made; stomachs are opened, intestines repaired, gall-bladders, ovaries, wombs and prostates removed; wide and often successful operations are performed for cancer with relief and prolongation of life; compound fractures are turned into simple ones and refractory broken bones are wired; abscesses are shielded from secondary infection; joints are spring-cleaned and limbs are saved. Conservative surgery triumphs and human carpentry is safe.

Lister created anew the art of healing, and made a reality of the hope which had for all time sustained the surgeon's endeavours and which had been but the vision of the dreamer. The discovery was splendid in its simplicity, and magnificent in its littleness.

The flood tide has extended to medicine. Serums and vaccines are displacing pills and potions; respiratory diseases are known to be almost entirely microbic, and intestinal complaints are largely due to the same cause; epidemics are understood and rational measures adopted; fevers are recognised as Nature's response to the invader; typhoid, diphtheria, and cholera no longer run riot; the pneumococcus and tuberculous bacillus are arraigned, and their sentence is only a question of time. One form of fatal insanity has been traced to a minute organism, and what the future will disclose of mental disorder due to germinal intoxication no one can estimate. Skin diseases are largely treated by antiseptics, and venereal diseases are known to be caused by germs, and their extinction is only a question of time.

In no department have more brilliant results been achieved than in midwifery. Lying-in hospitals that were pest-houses and but too often the chambers of death, are now pleasant boarding-houses, and child-bed has been almost rescued from hazard. The horrible struggles with puerperal sepsis have nearly disappeared, and countless mothers who years ago would have succumbed are saved to rear the lives they have given. Puerperal sepsis is regarded as almost preventable, and due in the vast majority of cases to neglect of antiseptic measures, and that in these days of enlightenment it should still claim many victims is a scandal and reproach.

These are but the skimmings of the subject. Volumes would be needed to display the matter; the historian of the future will have a far longer story to tell.

> "Regions Cæsar never knew
> Thy posterity shall sway!"

No limits can be assigned to the regions that await conquest. We have but fringed the question. Every door reveals new vistas.

Disease has diminished in astounding proportions and its wail of suffering declines. "The span of life in England seems to have increased by about a third since 1865," * and that is the year in which Lister began his work!

Leeuwenhoek, the brilliant Dutchman, the inventor of the microscope, first glimpsed the microbe in 1675, and Muller in 1786, Schwann in 1837, and Cohen and others followed the quest. Pasteur unearthed it from

* Professor J. Arthur Thompson, *Control of Life*, p. 162.

the obscurity of scientific memoirs, passed it into current coin and started Lister on his course. Tyndall established biogenesis, and Koch and Erlich originated new methods of research. Let each be enshrined in the Temple of Fame. We see a little further by standing on others' shoulders, but Lister drew the great induction that fever is a fermentation.

We will never realise the dream of the poet

"All diseases quenched by science, no man halt or lame or blind,"

but who can doubt that the dawn of that transcendent day is nearer? And when we think of the thousands who are following in his train, who can picture the future?

But will that future ever produce a greater benefactor than Joseph Lister?

* * * *

It is only after a brief survey that we realise how far we have travelled.

Fifty years ago the microbe was unknown to most, a surmise to some, and a jibe to others. To-day we know that with it are the issues of life.

It is an indispensable servant but a dread master, and the question for civilising man is how to thwart its evils and utilise its good.

The greatest of the past, the Alexanders and Napoleons who shook the world and reconstructed empires, are but pigmies compared with Pasteur and Lister. They brought death, but these brought healing.

What a privilege it has been to write of him, and to put on record some of the details of his world-transforming work.

I have tried faithfully to record all that memory recalls, and have not consciously overcoloured the picture. Should the reader think otherwise, and that at times I have been swayed by emotion, I can only say: "You never knew Lister!"

"THE PASSING OF LISTER

"By the death of Lord Lister, P.C., O.M., F.R.S., F.R.C.S., etc., surgery has lost her most brilliant student and her greatest master, England one of her most famous sons, the world one of its most illustrious citizens.

"He raised surgery from a dangerous and precarious practice to a precise, safe, and beneficent art, and in doing so his name became renowned throughout the civilised world.

"His methods have been adopted in every clime and country, and the benefits which flow from his discoveries are blessings conferred upon every race of mankind.

"His perspicacity, natural insight, fertility of resource, power of close and discriminating observation, philosophical reasoning, inflexible pursuit of truth, steadfastness of purpose, capacity for taking pains, unwearied patience, and undaunted efforts to triumph over difficulties stamped him as a great example of true and scientific genius.

"The human sympathy which caused him to deplore the great mortality due to infective surgical disease, his solicitude to prevent suffering and premature death, his patience and unceasing labour to overcome them, and his gratification at the ultimate success of his efforts to ameliorate pain and prolong life eminently distinguish him as a great philanthropist.

"His gentle nature, deep compassion, imperturbable temper, resolute will, indifference to ridicule and

tolerance of hostile criticism combined to make him one of the noblest of men.

"His work will last for all time; its good results will continue throughout all ages; humanity will bless him evermore, and his fame will be immortal.

"In the fullness of years, after a glorious and satisfying career, crowned with great and various honours, having witnessed the successful completion of his work, the gentle hand of Death laid hold upon him, and Lister passed from among us.

"His funeral was a vast and striking testimony to the greatness and usefulness of his life. His body perisheth but the influence of his mind will continue everlastingly."

From the Annual Report of the Royal College of Surgeons of England for 1912.

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